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BEHIND THE SCENES:
The Night of the Pittsburgh Disaster

by Rita Sands

On the evening of September 8, perhaps you were just sitting down to dinner or watching the national news when USAir Flight 427 plunged to the ground outside of Pittsburgh, PA, killing all on board. You probably saw the news pictures of frustrated rescue workers unable to help anyone, heard the instant and mostly false analysis by non-aviation reporters, and watched the frantic activity the next day as the National Transportation Safety Board tried to answer one question: Why? What you didn't see were the actions and emotions of FAA's Eastern Region employees. What follows is representative of the behind the scenes actions of FAA employees anywhere in the U.S. and abroad when what we all work to prevent tragically happens.—Editor

It had been a quiet, uneventful evening, September 8, as Steve Shaw, Regional Operation Officer, remained on duty alone in the Operations Center. Then, a call came in just after 7:00 p.m. from Pittsburgh Approach. This would be the first notification to Eastern Region Headquarters that radio and radar contact had been lost with an aircraft in the traffic pattern at Pittsburgh.

"We think we have a major!" is what Pittsburgh told Shaw. He took a deep breath and headed straight into a long night. Shaw recalled, "I knew I had to get ahold of a lot of people, real quick!" And the calls began: to Air Traffic, to the NTSB, to Public Affairs in Washington and New York, to Airway Facilities, to Flight Standards and the field office in Pittsburgh, and to "all the people who needed to be on scene right away."

Contact was made quickly with Regional Administrator Arlene Feldman. She remembers receiving the news with a very heavy heart: "Those of us involved in aviation as a lifetime profession and view our work with such pride, have a deep emotional reaction when an accident of this magnitude occurs." Feldman remained glued to the telephone for many hours that night, throughout all the telecons and briefings, to give guidance and support.

In the Ops Center, Steve Shaw would receive confirmation that it was USAir Flight 427, inbound from Chicago, that had terminated in a crash, eight miles from Pittsburgh Airport. It was estimated there were at least 130 fatalities. As awful as that fact was, Shaw kept his reaction within his own thoughts. "I had a job to do, and it need to be done fast," he said. The calls kept going out to all operating divisions, to Security, to Aviation Medical, to the aircraft manufacturer, to the National Weather Service.

The manager of the Ops Center, Tom Trubiano, who lives in Queens, NY, had come home from dinner in Manhattan that evening and was met with the news: "We lost one in Pittsburgh." This is the kind of emergency Trubiano thinks about nearly every day; he has to, to be ready. At home, his clothes are always lined up near the door, and his car is nose-out to the driveway. He knows it takes him up to 15 minutes to drive seven miles to JFK Airport. "Every minute lost in getting to the Center," he said, "is another minute that compounds how far behind I feel in getting

things organized." This night he was off and running and wouldn't stop for 11 hours.

Unexpected help was also on the way to the Ops Center. James Szakmary, working late on a project for Aviation Education, was walking down the hall toward Ops seeking a fax machine. It was not unusual for him to detour there; he was on staff in Operations for several years. Once in the door, he had only to look at Shaw to know something major was happening.

"We have an accident, a BIG accident," Shaw told him. Szakmary pitched in immediately and was on the phone with someone from Pittsburgh Airport who was actually at the scene of the downed plane. There was talk of "fire, and a huge explosion. It was at that moment I realized the extent of the catastrophe. There was no time to get sad or reflect on what might have happened. We had to keep making necessary notifications to everyone needed in the loop to maintain a line of communications."

Calls were coming in from other FAA facilities in New York, New Jersey, and Pennsylvania, double checking their information. In the background, the television carried glimpses of the crash scene and an extraordinary amount of debris; reporters were taking eyewitness statements—a constant reminder of the horror that had happened.

Manager Al Zito from the Pittsburgh Flight Standards District Office just happened to be in the USAir situation room when he began relaying information to Szakmary, who commended Al, saying, "He was like a diamond in the rough."

Policy and procedure can carry people just so far. Individual judgement and the sincere desire to be helpful kept the Ops Center supplying fresh and valuable data throughout it all. Who was there, and what they had to face that night, was in some measure up to fate.

For Dick Battaglia, Assistant Airport Manager at the FAA Technical Center in Atlantic City and Supervisor of the Ops Center there, the news of the accident was especially frightful. His 22-year old stepdaughter was scheduled to take USAir Flight 427 from Pittsburgh to its final destination that night, Palm Beach, FL.

He scrambled to find out if the downed plane had been inbound to Pittsburgh or had just taken off from there. The difference would mean everything. His heart-pounding search for information led to a flurry of calls within the FAA, but at that time colleagues could only relay initial reports that the plane was reported inbound from Chicago. There was no official confirmation. "Something kept telling me it couldn't be her plane," recalled Battaglia, and he clung to the hope until he knew for certain. "This experience," he said, "has changed my life and how I view my job." This time he was on the other side of the equation and said this terrifying personal ordeal gave him insight into how terribly important it is for people in an aviation crisis to get the information they need, quickly and reliably. He is committed to doing his part to improve the system.

Everyone knew there would be intense media coverage and that it would come fast. It did.

This is where my recollection comes in. I'm Rita Sands, the [former] head of Public Affairs for the Eastern Region, and I'd been on the job only about a week when the unthinkable happened in Pittsburgh. I had just driven home to Connecticut and was attending a Volunteer Fire Department meeting when my beeper was activated. In a room where everyone responds to emergencies, the sound brought us all to our feet. When I saw it was the Ops Center calling, I felt a chill come over me.

I returned the call and rushed home to set up a command post at my kitchen table, monitoring both television and radio, as I was folded into the FAA telephone network. This was my first introduction to the system, and it was totally engulfing. An endless string of voices tying facts together with professionalism and courtesy. I was given the information I needed to begin responding. The first few calls I handled were from CBS Network, where I used to work as a broadcaster. I knew what they would be asking.

Don Perry was on duty that night on detail for Public Affairs. This was the first major airline accident he had ever been involved with, and it had a profound effect on him. Said Perry, "It was like a slap in the face, a terrible and stunning event for all of us who work so hard to make our aviation system safe. Something let us down; something somewhere went wrong, and it's no longer a theoretical thing. The human cost of it was painful." Perry said he "kept a grip" and began taking media calls.

All the major networks and many local stations throughout the country had early live coverage of the accident scene and eyewitness accounts that reconstructed what has got to be any air traveler's worst nightmare.

James Szakmary remembers when he got home that night and watched news reports originating near the crash site in Pittsburgh and saw emergency crews and ambulance drivers with their hands in their pockets, he knew "there was more death than life there."

The entire country was linked to the scene through live television and radio, hanging on every word that might explain what had happened. In that charged environment, the FAA's Washington Public Affairs stepped out quickly and with impressive calm. Their answers had come from behind the scenes, through the Ops Center, from all corners of the FAA.

There were several major telecons that evening, but the biggest brought together some 40 people at one time. One by one they did their best to build an information bank that could help the FAA and investigators respond to the crisis with certainty and intelligence.

Many of these same people would come together again just 76 hours later, when at two o'clock Monday morning, they would be awakened with the news: *A small plane has crashed on the south lawn of the White House.* ■

Paula Porcello also contributed to this article. Ms. Sands has been a news correspondent and anchor for major networks. She is a licensed pilot, a certified emergency medical technician, volunteer with her local, rural Connecticut fire department, and free lance writer on small town America. This article originally appeared last October in the FAA's Eastern Region Intercom, *an in-house newsletter.*

HIGHLY INVISIBLE

by Phyllis Anne Duncan, *Editor*

We have all seen old western movies where the good guys chase the bad guys across miles of desolate desert, guns blazing. One bullet finds its mark, and the bad guy and his horse tumble headlong to the ground. It looks violent, and it is. What the "special effects" people did was deploy a trip wire a few inches above the ground across the horse's path. The horse comes tooling along at top speed, trips on the wire, and provides a very dramatic, photogenic fall. If unhurt, the horse and rider may have to make another take, and another, and another... Movie makers would like us to think that the horse as well as the stunt person rider "know" how to fall. Believe me, a horse's brain revolves around eating and procreating; it doesn't know how to fall, so under pressure from the U.S. Society for the Prevention of Cruelty to Animals, movie makers have abandoned this stunt.

The sudden cessation of forward motion of a horse tripped up by a wire deliberately laid in its path can be experienced by an aircraft and its pilot when they inadvertently strike a powerline or wire hundreds of feet above the ground. The outcome is never quite as "harmless" as the orchestrated movie stunt fall, but in the case of an aircraft, the wire is not deliberately placed but can be just as difficult to see. An encounter with powerlines can give you the feeling of abruptly encountering a brick wall, with sometimes fatal circumstances.

Aircraft accidents involving wire strikes do not comprise a large percentage of total accidents yearly. Wire strikes predominate in agricultural aircraft operations, helicopter operations, and ballooning—most likely because these aircraft typically operate at low altitudes. (Indeed, wires sometimes appear to be a particularly frequent bane for balloonists.) Airplanes have their share of wire strike accidents, usually because of deliberate buzzing, scud running, or poor flight planning but rarely during typical cruise or high altitude operations. NTSB has classified many wire strike accidents as "unwarranted low flying," and the majority of those accidents were fatal.

Where Wires Can Be Found

Although the FAA requires the towers or poles that support wires to be marked or lighted if they impinge upon navigable airspace near an airport or airway, the wires themselves do not have to be marked. Some state governments require wires near airports to be marked, and some utilities have voluntarily installed inexpensive and highly visible markers on wires.

Wires necessarily have to be as small as possible to prevent their own weight from dragging them down. Wires are made from various materials—steel, aluminum, copper, or a combination—and that color changes with age and climate effects. The result is that they can blend easily into whatever background may be present. As a consequence, at twilight or at certain angles in bright sunlight, wires can be highly invisible. The wires that give pilots the most grief are the least visible of all—the slim, taunt guy wires used as braces between towers or from towers to the ground.

The main wires themselves may sag many feet below the tower tops, leading many an unwary pilot to believe it is safe to cross over the main wire at tower height. However, that is the ideal altitude for striking a guy wire. And wires do not necessarily cross towers or other wires at right angles, and there may be smaller wires more difficult to see above or below larger wires that can be seen.

For that reason, flying under the main wires may not be a solution either. In some places, telephone wires at a lower height may be hitching a ride on utility poles. Also, supporting towers or poles may be camouflaged by trees or terrain, which can hide the presence of the wires. Of course, a tower or utility pole qualifies as a structure under FAR § 91.119 (Minimum safe altitudes), and except for the purpose of takeoff or landing, a pilot must not operate closer than 500' to it. Indeed, the best preventive action could be to fly high enough to clear all obstacles. A great many wire strikes could have been prevented by adding 500 or 1,000 feet to the altitude.

Learning the Hard Way

Many years ago a California agricultural pilot had a wire strike that set him on the road to learning all he could about how to prevent them and how to survive them. More than 30 years ago, he clipped telephone wires while treating some crops. After the struggle to bring the Piper *Pawnee* under control,

he immediately and instinctively began a descent for an emergency landing. Unknown to him, he was trailing yards and yards of telephone line that was tangled in his landing gear. The trailing wires struck a nearby powerline the pilot thought he had sufficient altitude to clear. The impact dislodged a transformer and caused another near loss of control. Fortunately, a wide open field lay straight ahead, and the pilot put the airplane down there.

After the accident and during his research, the pilot found a dearth of information. He decided to supply his own, and in the years afterwards he published many articles in agricultural aviation publications. His hope was that other pilots would not have to learn first hand.

The Best Prevention is Avoidance

What this ag pilot came up with in terms of prevention can apply to any aircraft. The first piece of advice applies to any flight—***know your area.*** An ag pilot makes a practice of overflying a field or walking it—observing it from the ground before he or she treats it to ascertain the positions of any wires or other obstructions. With that knowledge the pilot can plan the swath runs to avoid them.

A non-ag pilot doesn't usually have that opportunity. All we have are our sectional charts, which show only the most prominent of powerlines but with no indication of wire height. Individual tower heights are provided, however, and occasionally an area of highly concentrated wires will be called out as a caution on the chart or in the *Airport/Facility Directory*.

In a 1992 article in *Business and Commercial Aviation*, the author states that, "The single most effective means to avoid wires is to spend more time at the flight planning desk, plotting the flight along routes and at altitudes that are known to be free of obstacles. . . . Check all available map sources."

What is not shown on charts is the single wire stretching across a pasture to a house in the middle of nowhere. Not only a concern to the ag pilot, this configuration can wreak havoc with an otherwise by-the-book emergency landing—which leads to another piece of advice: ***Never assume anything.*** If you don't see wires or poles in an area, expect them to be there and thus keep an eye out for them. Vigilance means you may be less likely to be taken by surprise by wires.

The presence of wires considered as a possible hazard to airport traffic is indicated in the *Airport/Facility Directory* (A/FD) or commercial publications on airports. The words "P-line" next to the runway number in the runway information section of the A/FD entry for a specific airport means that the airport management felt the wires were close enough to the airport to warrant special pilot attention. A check of the chart or a phone call to the airport can pinpoint the wires' exact location—parallel to the runway, across the approach end, etc. This can aid the pilot in developing a mental picture of what to expect upon arrival.

A check of the weather is also important for proper planning for any flight and for wariness of powerlines. Low fog or clouds may hide the wires if not the towers. While operating IFR, minimum altitudes allow for obstacle clearance, but upon breaking out for the final approach, your eyes and your knowledge of the airport's immediate environment are the keys to obstacle clearance.

If all of the above fails, balloonists suggest that when avoidance could become contact with wires, the pilot and chase crew should develop an emergency plan in the event that the balloon comes in contact with electrical wires. Some balloon authorities suggest practicing landings after simulated wire strikes. At altitude, balloonists simulate reaction to powerline strikes by practicing rip outs, a maneuver where the balloon's envelope is opened to let the hot air or gas escape. The result can be a hard landing but, as some veteran balloonists say, "Better than burning." For this maneuver, the pilot, of course, needs to select an open field free of hazards so that the simulated emergency doesn't become a real one.

Balloonists also stress *avoidance* of wires by careful planning and vigilance when operating near wires. The low, slow, quiet balloon flight offers such beautiful views that distraction may be a factor in failing to avoid wires. This distraction can affect passengers and pilots alike, and passengers should be briefed to point wires out to the pilot. Extra eyes are really helpful.

Wire Collision Avoidance "CHECKLIST"

☐ Check yourself.
☐ Plan ahead.
☐ Know the regulations.
☐ Keep a clear field of view.

Seeing Wires and Avoiding

Many times pilots who survive a wire strike accident say, "I simply didn't see it." Earlier we talked about how small, thin wires may be hard to pick up in haze or a glare. People with less than perfect vision—even when it's corrected—may have trouble seeing wires. Our ability to see any object depends on a number of things:

1. Angular size of the object. Wires are small in diameter and have few angles.
2. Object illumination. Towers may be marked by lights but wires rarely are.
3. Differences in color or reflectivity between the object and its background. Metals used in wires or their coverings may fade and blend into the background.
4. Length of time you see it. When you're moving relatively quickly, you have less time to spot wires, recognize them for what they are, and determine evasive action.
5. Degree of retinal adaptation. This varies with individuals, outside conditions, and lighting level in the cockpit.
6. Condition of the atmosphere separating the observer and the object. Hazy air is particularly obscuring of wires.

When each of these factors is ideal, the better the visibility. Also helpful for all of us over-40 pilots is to get regular eye check-ups and wear your corrective lenses when you're supposed to.

Scanning for powerlines can be just as important as scanning for traffic (although don't do one exclusive of the other). Just as when scanning for traffic, side to side is not enough. We're in three dimensions up in the air, so scan up and down as well. Move your head! There are many different scanning techniques. For example, there is the block system, where you divide the horizon and azimuth into sections of 10 degrees or so and scan each block in turn, then start all over again. When you have a large area to scan you can "subdivide" the blocks into smaller ones. The scan pattern is much the same. As we said before, *expect* powerlines and look actively for them.

Helicopters and Wires

Another aspect of aviation that suffers a large portion of the wire strikes is rotorcraft operations. According to the Helicopter Association International, for a recent year, wire strikes accounted for seven accidents per month worldwide. Wire strikes are generally 10 to 15% of all helicopter accidents, and of all helicopter wire strike accidents, 52% are fatal. VFR conditions were present for 95% of wire strikes, and 83% of all wire strike accidents occur in bright sunlight conditions. This prompted HAI, in its Fall 1992 issue of *Rotor*, to state a cardinal rule: "Never fly into a low sun when in the proximity of wires."

To deter wire encounters, some rotorcraft are equipped with wire cutters or deflectors, a long blade designed to cut through the wire before it can bring the helicopter down. These systems do work and are effective in cutting wires up to one-half inch in diameter. However, helicopter operators stress that *wire cutters do not substitute for avoiding wires* in the first place.

There are some caveats about wire cutters, especially where large wires, such as electrical transmission lines, are involved. These wires are usually larger than one inch in diameter, are wrapped in aluminum strands, and have a steel core. When operating near such wires, pilots of cutter-equipped helicopters should note the following:

- They generally will not be cut by wire cutters.
- They sag as much as 40 feet from winter to summer.
- Their towers are usually quite far apart—as far as one-half mile.
- They usually have small static wires above them.

In other words, look out, and don't get complacent if you have wire cutters.

Helicopter operators also suggest slowing down when operating near wires. This would reduce the force and damage in a wire strike. Again, this is particularly important when operating in lowered or marginal visibility where the wires may "appear" suddenly out of the murk.

When All Else Fails

What do you do if all else has failed and you strike the wire anyway? Whatever action is taken must be taken quickly, literally within seconds and almost automatically because the strike generally occurs close to the ground. This can make the difference between a serious accident and a "there-I-was" story at the next hangar flying session. (Note: For any emergency situation refer to and follow the instructions in the aircraft's flight manual or pilot operating handbook.)

- First and foremost after a wire strike—***FLY THE AIRCRAFT!***
- Regain control and add full power, if available. Power is important if you happen to hook and trail wires. Power also gives you an extra edge in airspeed that you may need.
- Once clear of the wires, climb at V_x (best angle) to preclude the possibility that the wires you may be dragging may strike other lines. That problem you don't need. You may not always be able to tell if you are trailing wires, except by the "feel" of the aircraft, but assume that you are until you can determine otherwise. Climbing also gives the pilot sufficient altitude to stabilize the aircraft, inspect as much as possible for serious damage that could lead to control problems, and calm down before making an emergency landing.
- Carrying lengths of wire, of course, adds to the aircraft's weight and increases stall speed, so a higher airspeed and a faster than normal approach should be used for a safety margin. A power-on landing in an airplane would be preferable, and plan the approach as carefully as you can because a go-around is an unlikely option.
- If the wire strike occurs during an emergency landing where no power or only partial power is available, reestablish control of the aircraft as soon as possible and continue the glide to the selected landing area.

After a wire strike, you may not have much time to plan even when you are aware of possible lines in the area. A wire strike is startling—to say the least—under any circumstances. The key is to be prepared for any expectation in your planned flight, and don't let momentary surprise turn into sustained panic.

After all, like the movie horse, you want to be able to get up again. ■

Additional References:

October 1992, Air Beat, *Journal of the Airborne Law Enforcement Association.*

Fall 1992, Rotor, *Helicopter Association International.*

November 1992, Business and Commercial Aviation.

March 1991, Wire strike series, Balloon Life.

Flight Amid Vertical Terrain

or "Confessions of a Former Flatlander"

by Kevin D. Murphy

Mt. Flying

Part Three

In the first installment, we huffed and puffed at density altitudes of over 13,000 feet and learned why not many light, two-place training airplanes live at mountain airports. Part two revealed unusual sources for weather information, explained why flying in valleys is preferred, and considered wind as a factor in preflight planning.

The third of this four-part series explores ways to cope with rugged Western turbulence and dust devils and creative ways to use ATC services where no radio communications exist. Ways to get a good mountain flying checkout and the role of state aviation agencies in maintaining airports and navigation aids are also included.

This series is meant primarily for general aviation pilots flying singles and light twins without turbochargers, although most of the information is valid for nearly any type of aircraft. Most examples are set in the American West because of the higher terrain and more jagged slopes, but the principles apply equally to lower, but mountainous, terrain in the East.

One caution: Do not, under any circumstances, try flight in high density altitudes or mountainous areas without a thorough checkout from an experienced mountain pilot.

Turbulence

There's one other facet of high country flying, especially in the high desert areas, that catches pilots by surprise. It's the turbulence.

"Fly early in the day or toward evening," caution mountain flying instructors. "The middle of the day is liable to beat the living stuff out of you."

The warning is true all year, but the heat of summer in the high desert produces thermals and convective activity that—some days—may make you wish you'd stayed home. Flying before 10 a.m. or after 5 or 6 p.m. during the summer helps considerably and helps preserve the supply of "sick sacks" that ought to be kept in the airplane.

Besides, the starkly beautiful Western landscape is even more breathtaking when bathed in the low, golden rays of early or late sunshine.

On my very first mountain flying checkout, there was what most Western pilots would call "moderate to severe" turbulence. At the time, I had over 3,000 hours of flatland flying, but my knuckles were white on the yoke.

Have you looked at the official definitions of turbulence in the *Airman's Information Manual* recently? "Moderate" turbulence is defined by ". . . causes variations in indicated airspeed . . . occupants feel definite strains against seatbelts. Unsecured objects are dislodged."

"Severe" turbulence, on the other hand, means being tossed violently against seatbelts, with large, abrupt changes in altitude and airspeed. On my initial checkout, it was severe. I was concentrating on maintaining some semblance of altitude by jockeying power and attitude while trying to stay within 30 or 40 knots either side of maneuvering speed.

"Don't bother trying to maintain altitude," advised my instructor. "It's just not worth it, and you'll wear yourself out in a short flight."

For VFR flying in those kind of conditions, most Western pilots are happy to accept thermals as free power, knowing that subsequent downdrafts will be along shortly. Once I'd learned to accept the power of Mother Nature, aeronautical life became much easier.

Of course, maintaining an altitude is necessary if ATC requires it in a terminal area or if flying IFR. But in the uncrowded skies outside of the few terminal areas of the West?

There is a FAR (§ 91.159) that requires even or odd altitudes plus 500 feet, depending on magnetic course, when in level flight. But that rule only applies when flying more than 3,000 feet above the surface. Above jagged terrain, pilots of singles and light twins may frequently not be more than 3,000 feet above the terrain. And when even the valleys start at 6,000 or 7,000 feet and the mountains may tower to 12,000 or more, it's hard to stay above 3,000 feet AGL without oxygen anyway.

OFF #13: If VFR in heavy turbulence and not required to maintain an altitude by ATC, let Mother Nature have her way. Life is too short to do it any other way.

Dust Devils

One other Western phenomenon I'd never seen in all my time as a flatlander is the dust devil.

Dust devils are small, low-power tornadoes. They twist and dance along the desert floor in the American Southwest, stirring up the dust that gives their name.

Dust devils are most common during the summer. You can usually see them coming, but predicting their path is not possible. They vary in strength but are strong enough to turn perfectly good airplanes into scrap metal.

In fact, I hit one on climbout one day in a turbo-charged Cessna 206. The air had been relatively calm when, at maybe 200 feet above the ground, the airplane felt like it was a bone being shaken by a dog. I instinctively shoved the nose over to maintain airspeed and a second later was out of the turbulence, but the adrenaline continued to flow for several minutes.

A year or so later, I was doing an airport inspection at a rural Indian strip in western New Mexico. There were no tiedown chains on the ramp at this airport, which is used primarily as an evacuation point for the Indian Health Service hospital there, so I just parked the Cessna 172 on the ramp and went about the business of inspecting.

I was measuring an approach slope at one end of the runway when the corner of my eye caught something moving. It was a dust devil, moving in from the southwest and traveling fast. I started running for the unsecured airplane on the ramp, but the dust devil continued straight for the airplane and was gaining on me.

I reached the airplane and jumped into the cockpit, hoping to add enough weight and use the controls to keep the airplane upright if the dust devil hit.

It did, and I did. Like my encounter while climbing out a year before, it was all over in a second, and the airplane stayed on its feet. A few months after that, I was visiting an FBO near the Colorado border, and he showed me pictures of a customer's airplane that was loaded onto a truck. One wing had been bent back at an obscene angle.

"Dust devil," he said. "Guy just parked it there, waiting for fuel. Insurance people declared it a total loss."

Kevin Murphy

The starkly beautiful Western landscape is even more breathtaking when bathed in the low, golden rays of early or late sunshine.

OFF #14: Watch for dust devils or other high winds, and always tie down your airplane. Chains (not ropes) are standard on Western airports for a reason.

FSS Communications

As you might suspect, radio (and radar) contact can be spotty in the West, especially at the lower altitudes where many of us general aviation pilots roam.

In fact, a few Western pilots relish the independence of flying without the security blanket most of us take for granted. Must be the cowboy spirit of rugged individualism.

But the holes in radio (and especially radar) contact can be unnerving to flatlanders comfortable with constant FAA surveillance. I'll never forget one such pilot, who flew into Santa Fe last year with his wife for a seminar on mountain flying. He had never been west before and was highly agitated.

"They lost me!" he screamed. "I was just descending through 9,000 feet and the controller said 'radar contact lost' like it was nothing!" Then he wanted to know why Santa Fe didn't pick him up on terminal radar, and I had to break the news gently: Santa Fe doesn't have terminal radar. He was incredulous, and most anxious to head back east where his radar blanket was nearly always there, warm and comforting.

There are some long stretches without radar coverage in the West, at least below 10,000 or 11,000 feet; FSS communications are better, but there are still areas where a climb to near-oxygen altitudes is needed to hear the voice of an FSS.

Fortunately, Remote Communications Outlet (RCO) facilities are being installed in many of those remote areas. Using those new outlets is easy; most offer a common FSS frequency that can be used for both calling and listening. The sites and frequencies of the RCO's are shown on aeronautical charts.

Be sure to include both your frequency and location on your initial callup when using these RCO's, since a specialist at one of the new automated FSS's may be listening for a dozen or more of these sites. A sample callup might be, "Big City Radio, Cessna 12345, 122.3, Dinkysville."

There are also a few local FSS's at non-tower locations that still offer Airport Advisory Service on 123.6. Until they're replaced by RCO's linked to automated facilities, they'll continue to offer the usual wind, weather, altimeter, runway in use and known traffic.

Pilot reports, especially with changing weather, are greatly appreciated by high country FSS's since weather observers or AWOS/ASOS units can be few and

far between. The Flight Watch frequency of 122.0 isn't always reachable from valleys in the high country, but any FSS briefer will be glad to take a report on any usual FSS frequency.

Some VOR stations can also be used to communicate with the FSS; a "shingle" box underneath the VOR information box on a chart will identify the associated FSS. This valuable feature isn't always available, since the new Hazardous Inflight Weather Advisory Service (HIWAS) sometimes takes over the voice frequency; the legend on each aeronautical chart will tell.

OFF #15: Knowing all the ways to communicate with Flight Service and offering pilot reports can add peace of mind on any flight, not only for yourself but also for those who follow you.

Flight Plans

The lowly VFR flight plan—oft forgotten by pilots anxious to charge off on a crosscountry flight—takes on special significance in rugged terrain.

"Out here, we either find you in a matter of hours, or we don't find you at all," my first mountain flying instructor told me earnestly. "The first day is crucial to survival."

Unlike their IFR cousins, VFR flight plans are only a tool for search and rescue. In more populated parts of the country, many pilots omit filing VFR flight plans on the theory that any "off-airport landing" (often unkindly referred to by newspapers as a 'crash') will have dozens of concerned citizens calling 911 anyway.

In the West, however, an off-airport landing is likely to disturb only bears or jackrabbits, none of whom will come to your aid. Very few flatlanders have any real conception of what the term "sparsely populated" really means until they've flown in the West; the sudden enlightenment quickly convinces many pilots that VFR flight plans are worthwhile.

When filing VFR flight plans, the old aeronautical advice is as true now as it ever was: plan your flight, then fly your plan. Searchers have a tough enough time finding pilots who stay on course.

Keeping filed legs short is one way to maximize your chances of being found quickly in the event of a sudden stop. The popular "round-robin" VFR flight plan, which takes in every leg of a long trip and ends at the airport of departure, will not only delay the start of any search for you but will also require searchers to look along your entire route. It's much better to file short legs, opening and closing flight plans at each point along the way.

Position reports can take the guesswork out of a search should you have to stop short of your destination. Especially in the isolated West, position reports used to be the primary means of air traffic control; now they're used largely to keep search and rescue missions short. IFR position reports use the mnemonic PTA TEN: Position, Time, Altitude, Type of flight plan, Estimate to the next reporting point, and the Next reporting point beyond that, and using that format will give the search and rescue folks the most information should they need it.

An example might be, "Tucumcari Radio, Piper Arrow 12345, 122.6, Ft. Sumner, position report." After the FSS specialist acknowledges, you could confidently transmit, "Piper Arrow 12345, Ft. Sumner at :14 (14 minutes past the hour; presumably the specialist knows what hour it is), 8,500, VFR, Otto VOR at :47, Albuquerque." If you make an unscheduled stop later, at least the searchers won't look along your route prior to Ft. Sumner.

An abbreviated report suggested by the *Airman's Information Manual* includes just the aircraft identification, position, time, whether on a VFR flight plan or not and the points of departure and destination.

But how about those areas of the West where communications with the FSS are marginal, at best? Telephones, "assumed off" times, and relays through other aircraft can all be used to get the message through.

Assumed off times work very well at remote airports where FSS communications are available only through the telephone. After planning and filing the VFR flight plan, let the FSS specialist know to activate the plan at a specific time (presumably the time you listed for takeoff). If the specialist doesn't hear from you by that time, the flight plan will be activated just as though you had called on the radio for activation. Needless to say, be sure to call if you don't get off as planned, or your takeoff time changes enough to seriously affect your listed time enroute!

Relays through aircraft flying overhead work sometimes, but knowing which frequency the overhead pilot is monitoring sure helps! Common possibilities include UNICOM frequencies, Flight Watch on 122.0 (good below 18,000 feet) or the ARTCC (Center) frequency for the area.

OFF #16: VFR flight plans are well worth filing, activating and closing, no matter how cumbersome the process.

Radar Traffic Advisories

Even though radar coverage is not ubiquitous in the West at lower altitudes, it's still worth checking with the Air Route Traffic Control Center (Center) to see if VFR Flight Following is available. If so, it's wonderful insurance.

As always, VFR Flight Following is provided by controllers on a workload permitting basis, so don't count on this service to replace conventional safeguards, like VFR flight plans.

Center frequencies for a particular sector are plainly noted on IFR low-altitude enroute charts; local pilots will undoubtedly know the frequency by heart. Some state aeronautical charts also feature Center frequencies just because VFR Flight Following is so valuable.

No (official) Flight Plan

If all else fails—or even if it doesn't—many mountain pilots use the "unofficial" flight plan method. It involves asking your spouse, co-worker or friend to notify authorities if you don't show up when planned.

It takes a little planning for this option to work: distressingly often, a distraught spouse will call the sheriff's office to report a missing pilot but can't furnish the "N" number, aircraft type, route or any other useful information. Using a standard FAA flight plan form will include most of the information necessary to

start a search; adding the destination contact, with phone numbers, is very helpful.

Getting Checked Out

Learning to fly high terrain safely is a little like learning to cook: reading everything written about the subject is wonderful preparation, but it can't replace practical experience. In the kitchen, your first try at cracking eggs may produce only an annoying clean-up job, but suffering a "broken yoke" while learning mountain flying is much more serious.

Many high country FBO's advertise mountain flying checkouts, but—except for a few—the curriculum is not a formal or rigid group of skills and procedures. Depending on your level of skill and knowledge, a basic mountain flying checkout might take as few as 2 or 3 hours. An exhaustive checkout that includes many of the finer points of mountain flying may take several days.

Most of the former flatlanders I know have been both happy and safe by starting with the basics and letting their experience build as they enjoyed high country flying. Naturally, they were careful to plan flights that did not exceed their limitations, even as their proficiency grew!

Types of aircraft used in mountain flying vary, but most are the same ordinary tricycle-gear airplanes you'd find at lower-elevation airports. One difference you'll notice: there are far fewer of the lowest-powered airplanes, like Cessna 150's or 152's, or Piper 140's. Ramps in high country tend to fill with Cessna 172's and 182's, and Piper *Cherokee* 180's or even *Arrows,* because the density altitude degrades sea-level performance so severely. Surprisingly, there are not a plethora of turbo-charged airplanes usually available for rent.

And yes, tailwheel airplanes are also available. True bush-style pilots who routinely fly into raw, untamed dirt strips carved out of mountainsides usually prefer high-wing tailwheel airplanes for several reasons, not the least of which is ground clearance for the prop and wings. Not having a nosewheel that could drop into a pothole and break off, or cartwheel the airplane, is also appreciated.

Kevin Murphy

Especially in higher terrain, following valleys make sense. Aircraft performance is better at the lower altitude, civilization is closer, and emergency landing spots are frequently better.

OFF #17: Many flatlanders are happy to learn the basics of mountain flying, wading in cautiously to practice their skills before taking instruction for more challenging terrain or situations.

Elements of a Checkout

Every mountain flying checkout should include both an explanation and demonstration of density altitude problems, how to take advantage of (and avoid the dangers of) the effects of wind in mountainous areas, wind and weather conditions to avoid, route planning, and basic survival.

Early on in a checkout, mountain flying instructors will emphasize some basic rules. Among the most common:

1) stay keenly aware of the limitations of both yourself and your airplane, and never let passengers or even other pilots goad you into uncomfortable situations;
2) turn around well BEFORE you get so far into a narrowing canyon, a harsh downdraft, or rising terrain that turning around is risky, at best; and
3) never put yourself in a position that makes it impossible to turn toward lower terrain.

Each mountain flying checkout will be different, not only because of varying skill and experience levels of pilots but also because mountain flying instructors must work with the terrain (and airports) they have. The following is by no means an all-inclusive list. Nonetheless, some sample elements of a good checkout might be:

For takeoffs, both short-field and soft-field techniques should be reviewed since many high-elevation airports are not only short (for the density altitude) but may also be loose dirt, have tall grass or be generally unkempt. Crosswind takeoffs are also frequent. For beginning mountain pilots, procedures for leaning the mixture for takeoff will also be introduced.

At gravel strips, mag checks are sometimes performed on the roll (or skipped entirely) to minimize prop damage. Operations at one-way runways may be introduced, and a rule of thumb proposed for judging safe runway lengths (between 70–75% of takeoff speed attained by the halfway point). The effect of additional weight may be pointed out: adding just 10% to weight will add more than 20% to the takeoff distance!

If the checkout starts at a relatively low-elevation airport in cool weather, some instructors may simulate the effects of high density altitude by limiting throttle travel to perhaps 60 or 70% of full available power. Most beginning mountain pilots are amazed at the lack of performance. (Instructors use extreme caution to ensure a safe departure with this method!).

The effects of dust devils and sudden winds should be explained.

En route is where a choice of mountain flying techniques is often presented. If it's possible to get 2,000 or more feet

above the highest terrain, flights can usually be made directly from Point A to Point B (although terrain and survivability may be an issue in the planning stage). Often, though, those altitudes may be higher than comfortable, or even possible, for either the pilot or the airplane. In that case, visualizing lift, sink and the effects of wind around terrain is essential.

Preflight planning of routes is an essential item in a good mountain flying checkout. Staying in wide valleys, closer to both civilization and good landing spots in an emergency, is good practice. Planning to fly early in the morning or toward evening often makes trips much more pleasant because of the lower winds and much smoother air. Carrying minimal weight, but with a 50% fuel reserve and survival gear, is part of preflight planning.

Most pilots consider 25 or 30 knots of wind at the departure airport to be the upper limit for safe flight in mountainous areas, especially since wind velocity around peaks or ridges may be doubled due to a venturi effect. Visualizing—and flying to take advantage of—winds in mountainous areas will take a fair amount of flight time. Basic procedures such as approaching ridges at a 45 degree angle, flying a canyon on the side with lift, avoiding shadowed areas that usually mean downdrafts and avoiding canyons that have powerlines crossing them should be addressed.

Often, the phenomena of mountain wave can't be experienced on a checkout because the phenomena doesn't happen all the time. Any mountain flying checkout will include a thorough explanation of mountain wave and hints on how to identify and avoid it.

The importance of maneuvering speed in turbulence will also be covered, since big bumps taken at the wrong speed have been known to cause structural damage. Flying an attitude rather than an airspace will be emphasized.

Landing practice will probably include some sloping runways, where an optical illusion can cause your approach path to seem either too steep or too shallow. Determining wind direction prior to landing can be a challenge, too, since the windsocks at each end of the runway at many high country airports frequently point at, or away from, each other.

Mountainous areas also sometimes dictate something other than a standard left-hand pattern

Unlike most runways, mountain strips may have cattle or other animals that need to be herded off the runway prior to your landing. Low passes may help move animals, as well as provide a good look at the runway condition.

Night flying may be included, and obstruction clearance and instrument proficiency are two areas of major concern. The lack of lights in sparsely populated areas can very easily lead to vertigo unless pilots learn to rely on flight instruments. Also, mountains and other obstructions are not lighted, and can be impossible to see. Night flight in mountainous terrain will be covered in Part Four of this series.

OFF #18: In mountain flying, three of the most important rules are:

1) **stay keenly aware of the limitations of both yourself and your airplane, and never let passengers or even other pilots goad you into uncomfortable situations;**
2) **turn around well BEFORE you get so far into a narrowing canyon, a harsh downdraft, or rising terrain that turning around is risky, at best; and**
3) **never put yourself in a position that makes it impossible to turn toward lower terrain.**

State Aviation Agencies

One oft-overlooked resource for pilots planning flights in the beautiful high country of the United States is the expertise of the aviation agencies (or bureaus, departments, or divisions) of the various states.

Every state has some form of aviation agency, usually a small part of that state's Department of Transportation. The biggest responsibility of these agencies is helping ensure that public airports are kept up, and aiding local communities (who usually own the airports) with engineering and sometimes even financial aid.

Since state aviation personnel evaluate these airports on a regular basis, they often are good sources for information about the airports. As part of an agreement with the FAA, many states do the regular official "5010" airport safety inspections and keep copious files on those airports. State personnel are also often in contact with the locals responsible for the airports.

Those state aviation agencies are also the ones responsible for putting out state aeronautical charts. Many times, those charts have useful information not included on the usual sectional or WAC's issued by NOS, including local attractions or Center sector frequencies.

Especially in mountainous areas, states also often take the lead in installing special navigation aids or warning lights. Also, states will often foot the bill for installation of automatic weather observation systems (AWOS or ASOS), which take weather observations once a minute and report those continuously on a special frequency. The same reports are usually also available by telephone.

Several state aviation agencies in the West also have experienced mountain pilots on their staff, either as part of the state's executive pilot crew or as a safety coordinator who works closely with the FAA Aviation Safety Program. Some of the best advice—usually free—is available from them. ■

Coming up in the last of this four-part series on mountain flying will be a special section on the joys and hazards of night flying in the high country, as well as advice on search and rescue and a list of survival items considered "most essential" by experienced pilots.

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Communication Resources, Inc.

Precipitation Static (P-Static)

by Milton Hill

An increased awareness by pilots and maintenance personnel of problems that can be caused by P-static is important in ensuring aircraft systems are being properly protected to eliminate these problems. All pilots should be made aware and warned of precipitation static electrical interference with communications and navigation equipment. A review of pilot reports often shows different symptoms with each problem that is encountered. The following list of problems is a summary of many pilot reports from many different aircraft, but each problem or phenomenon was caused by P-static.

- Complete loss of VHF communications
- Erroneous Magnetic compass readings (30% in error)
- Aircraft flies with one wing low while auto pilot is on
- High pitched squeal on audio
- Motor boat sound on audio
- Loss of all avionics in clouds
- VLF navigation system inoperative most of the time
- Erratic instrument readouts
- Weak transmissions and poor receptivity of radios
- "St. Elmo's Fire" on windshield

In general, each of these symptoms was caused by one general problem on the airframe. This problem is the inability of the accumulated charge from triboelectric charging (P-static) to flow easily to the wing tips and tail of the airframe and be properly discharged to the airstream.

Types of Discharges

Streamer discharges, resulting from migration of accumulated charge across non-conductive surfaces and eventual discharge to airframe components, produces noise components which are of concern up to about five Megahertz (MHz).

Corona discharge, occurring principally from small-radius airframe and antenna elements exposed to the airstream, produce additional noise.

Arcing, which occurs between improperly bonded airframe components and accessories is typically troublesome out to approximately 50 MHz, can produce arcing and sparking noise with significant components up through and well above 1,000 MHz.

The use of VHF and UHF frequencies for communications and navigation has avoided many of the effects of discharge noise, both corona and streamer noise are nearly 40 dB reduced at VHF frequencies as compared with their VLF spectra.

P-Static—Causes, Cures, and Effects

P-Static is as serious a problem today as it was 50 years ago when static dischargers were invented and first came into use. Modern technology and state-of-the-art design in receivers cannot overcome or offset the problems of precipitation static.

Specifically, P-static is caused by aircraft in flight coming in contact with uncharged particles. These particles can be rain, snow, fog, sleet, hail, volcanic ash, dust, and solid or liquid particles. When the aircraft strikes these neutral particles the positive element of the particle is reflected away from the aircraft and the negative particle adheres to the skin of the aircraft. In a very short period of time a substantial negative charge will develop on the skin of the aircraft.

If the aircraft is not equipped with static dischargers, or has an ineffective static discharger system, when a sufficient negative voltage level is reached the aircraft will go into "corona". That is, it will discharge the static electricity

P-static can occur when a discharger is defective or parts are improperly bonded. Top photo: third discharger from the top on the vertical stabilizer is defective. Bottom photo: left engine spinner is not bonded to the airframe.

from the extremities of the aircraft, such as the wingtips, horizontal stabilizer, vertical stabilizer, antenna, propeller tips, etc. This discharge of static electricity is what you will hear in your headphones and is P-stat. This noise should not be confused with the clicking sound that might come from the ignition system or the whirring sounds from actuator motors, or the crackle, snap, and pop from atmospheric interference. The noise you will hear in your headphones or speakers in a P-stat condition sounds like frying eggs, (sputtering, spitting, etc.) or like a hiss, squawk, screech, and swoosh. These abnormal sounds are what you will hear in your headphones when you are in a P-stat environment without effective static dischargers on the aircraft.

If the aircraft does not have an effective static discharger system or has defective static dischargers, a large level of RF noise will be created when corona discharge takes place. This noise—or P-static—is then coupled back through the antennas into the navigation/communication receivers. This causes serious problems with the equipment.

Static dischargers are as necessary today as 50 years age. No matter how much money you spend on your navigation/communication systems or on your antenna system, they will not overcome an ineffective or defective static discharger system.

With the advent of Loran and Omega, which operate at very low frequencies, the requirement for an effective static discharger system is even more necessary.

The lower the frequency the more susceptible the NAV/COM or navigation systems are to precipitation static interference,

P-static or phenomena, which sounds much like precipitation static, can also be found in thundercloud areas at very high altitudes where volcanic ash may be found, between two cloud layers (cross field charging), from engine charging, etc. Static electricity will streamer across non-conductive portions of the aircraft, like windscreens, fiberglass radomes, fiberglass tip tanks, or any composite materials. Streamering is particularly severe a problem on composite aircraft. Where as P-stat occurs where precipitation, cross field charging and engine charging can occur in clear dry air.

Streamering can be reduced by using conductive gaskets in window mounts or anti-static paint on antennas, radomes, etc. However, before using anti-static paint on any antenna, etc, the manufacturer of these devices should be consulted. Some static discharger manufacturers also produce anti-static agents to overcome streamering problems and they are very effective.

Static Discharge Systems

Before the installation of an effective static discharger system, all bonding problems on the aircraft must be first solved.

What part of the aircraft should be bonded? If it is part of the aircraft and it is moveable or removable, it must be properly bonded. Bonding is the connecting of all conductive parts of an aircraft together so that they are all at the same electrical potential. Bonding problems or lack of them will cause severe noise problems. Along with carefully bonding of all moveable or removable parts, there can also be arcing problems. Arcing can be caused by: rusty screws, paint filed screw holes. loose fitting mechanical fasteners, and loose safety wire

A low voltage ohmmeter must be used to verify that all metals are properly bonded. A reading of less than 10 ohms must be considered satisfactory. Remember, bonding problems will render LORAN and Omega useless. Not even a quality static discharger system will overcome bad bonding. ■

Mr. Hill is an aviation safety inspector in the Airworthiness Systems and Repair Stations Branch, Aircraft Maintenance Division, Flight Standards Service, Washington, DC.

In the unlikely event of an emergency, you should be aware of the following:

Evacuation Slides

- ✔ Jump feet first into the center of slide.
- ✔ Do not sit down to slide.
- ✔ Place arms across chest, elbows in, and legs and feet together.
- ✔ High-heeled shoes can damage slides.

Rapid Decompression

- ✔ Pull oxygen mask toward you to start oxygen flow.
- ✔ Put your oxygen mask on as quickly as possible.
- ✔ Help children and others with their masks.

Flotation Devices

- ✔ Know where they are and how to use them.
- ✔ Life vests (under seat, if available), life rafts, and some seat cushions and evacuation slides can be used as flotation devices.

Evacuating the Aircraft

- ✔ Follow instructions of crew member, if possible.
- ✔ Stay calm and proceed quickly to exit.
- ✔ Leave all your possessions behind.

Fire or Smoke

Inflight—

- ✔ Use wet paper towel or handkerchief over nose and mouth.
- ✔ Move away from the source of fire and smoke.

On Ground—

- ✔ Stay low.
- ✔ Proceed by your predetermined count of seat rows to exits and/or follow floor proximity lighting to an exit.
- ✔ Exit the aircraft.
- ✔ Leave all your possessions behind.

Outside the Aircraft

- ✔ Move away from aircraft, fire, and smoke.
- ✔ If possible, help those requiring assistance.
- ✔ Remain alert for emergency vehicles.
- ✔ Never go back into a burning aircraft.

FLY SMART

An Air Traveler's Guide

Even though this information is geared for the non-pilot passenger on airlines, any airline passenger can heed these tips to increase safety on an already safe excursion. As Gen. Spruance said in the article on p. 22, the drive to the airport is the most dangerous part of your flight.—Editor.

Make Your Safe Trip Even Safer

When you fly on the commercial airlines of the United States, you are flying on the safest, most efficient form of transportation. When the rare accident does occur, more and more people survive because of advances in aircraft manufacturing and design, air traffic control technology, emergency planning, and cabin safety.

Aviation manufacturers, air carriers, and the FAA are proud of their contributions to aviation's impressive safety record. **You, the air traveler, play a very important role in aviation safety.** You can take responsibility for your own safety.

- Listen to the safety briefing
- Keep your seat belt fastened.
- Obey carry-on baggage restrictions.
- Wear sensible clothing.

Listen to the Safety Briefing

"Fly Smart" travelers always listen to the safety briefing because they know that every aircraft is different. The following are some tips to ensure that you are familiar with the aircraft you are on:

Take the passenger safety card out of the seat pocket and follow along while you listen to the safety briefing. Always take a moment to review the card before subsequent takeoffs and landings.

One of the best things you can do to be prepared is to mentally plan the actions you would need to take in an emergency. As part of this plan, count seat rows between you and at least two exits.

If you have any questions about the safety procedures, ask the flight attendant. Flight attendants are professionals; they know about the safety procedures of the aircraft.

Fly Smart.
Be responsible for your safety and make your safe trip even safer.

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Fasten Your Seat Belt

Of all the safety features aboard the aircraft, one of the most important is right at your fingertips—your seat belt. In a recent study, nearly 300 turbulence-related serious injuries to passengers were reported over a 10-year period. None of the injured had their seat belts fastened. To prevent turbulence-related injuries, "Fly Smart" travelers should always:

- Keep their seat belts fastened ***at all times.***
- Make sure their seat belt is secured snugly and low across the hips.

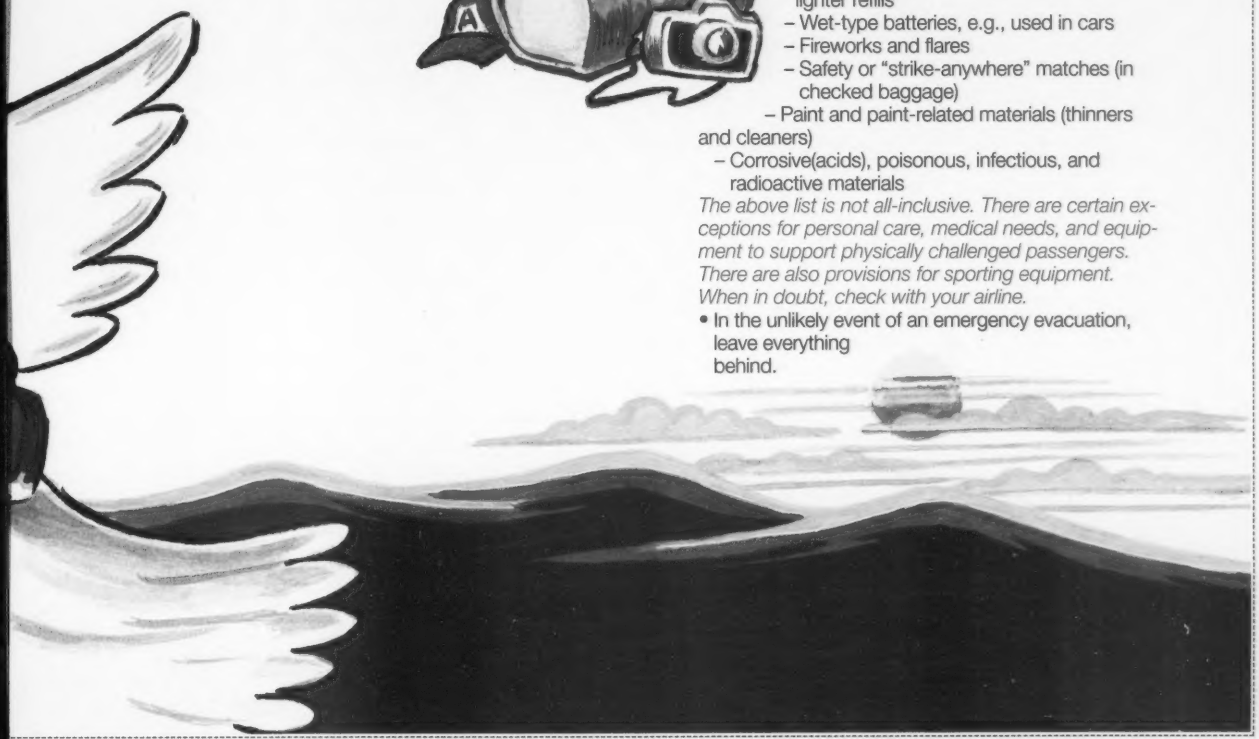
Obey Carry-On Baggage Restrictions

"Fly Smart" travelers should be aware of what they bring on board.

- Most airlines restrict carry-on baggage to ***two*** pieces per passenger.
- Carry-on bags must be small enough to fit under the seat in front of you or in the overhead bins. It's good idea to put the heavier items under the seat.
- Carry-on items could become flying projectiles during turbulence. Heavy items and baggage with sharp corners can be hazardous.
- Some hazardous materials are restricted. They can be dangerous if carried (or checked) on an aircraft. Following is a partial list of common articles from the home, workplace, or garage which, because of their physical or chemical properties, can pose a danger when transported.
  - Mace, tear gas, and other irritants
  - Aerosols containing flammable material (hair spray, deodorant, repellents)
  - Loaded firearms
  - Loose ammunition
  - Gasoline and other flammable materials
  - Propane, butane cylinders or refills, and lighter refills
  - Wet-type batteries, e.g., used in cars
  - Fireworks and flares
  - Safety or "strike-anywhere" matches (in checked baggage)
  - Paint and paint-related materials (thinners and cleaners)
  - Corrosive(acids), poisonous, infectious, and radioactive materials

The above list is not all-inclusive. There are certain exceptions for personal care, medical needs, and equipment to support physically challenged passengers. There are also provisions for sporting equipment. When in doubt, check with your airline.

- In the unlikely event of an emergency evacuation, leave everything behind.



And to ward off the inevitable post card from the Society for the Improvement of the English Language, I know that "Fly Smart" should be "Fly Smartly" to be grammatically correct, but "Fly Smart" is a bit of dramatic license appropriate for the brochure.—Editor.

Wear Sensible Clothing

For ease of movement and protection in the unlikely event of an evacuation, "Fly Smart" travelers should follow these guidelines:

- Wear clothes make of natural fabrics such as cotton, wool, denim, and leather. They offer the best protection. Synthetics may melt when they are heated.

- Wear clothing that allows freedom of movement. Avoid restrictive clothing.
- Wear low-heeled shoes or boots. (Shoes with laces or straps are recommended. Avoid sandals.)
- Arms and legs should be as fully covered as possible. (Long sleeves/pants are recommended.)

For multiple copies of the brochure upon which this article is based contact the Office of Aviation Safety, ASP-200, 800 Independence Ave., S.W., Washington, DC 20591; (202) 366-6001 for "Fly Smart—An Air Traveler's Guide."

Air Traveler's Checklist

Sensible Clothing

- ✔ Shirt—long sleeved, natural fabrics
- ✔ Slacks/Pants—Long, natural fabrics
- ✔ Shoes—Leather or canvas and low-heeled.

Child Safety Seat

- ✔ Check with airline for policy on use before arrival at airport.

On Board the Aircraft

- ✔ Safely stow carry-on baggage.
- ✔ Wear seatbelt snug and low across the hips.
- ✔ Keep your seatbelt fastened at all times.
- ✔ If you take your shoes off, put them on before landing.
- ✔ Review the passenger safety card before each takeoff and each landing.
- ✔ Listen carefully to the safety briefing.
- ✔ Ask questions if safety information is not clear.
- ✔ Make a mental plan of the actions you would take in an emergency.
- ✔ Be familiar with all exits.
- ✔ Count seat rows between you and at least two exits.

Exit Row Seating

- ✔ Listen to the safety briefing and/or read the written instructions for aircraft specifics.
- ✔ You must be physically capable and willing to perform emergency actions. If not, request another seat.
- ✔ You must know your responsibilities in the unlikely event of an emergency.
- ✔ Asks questions if instructions are not clear.
- ✔ Consider the effects of alcoholic beverages.

The Use and Abuse of Checklists

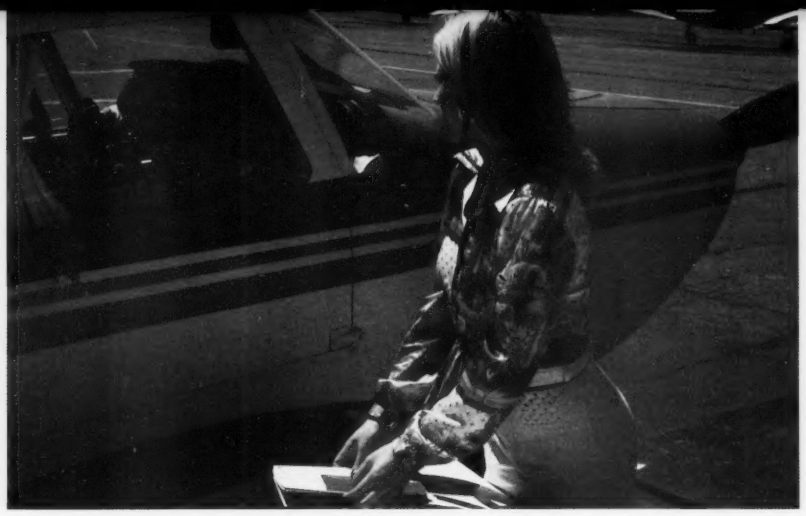
by Billy J. Singleton, *Aviation Safety Counselor, Birmingham, AL*

Checklists take many forms in our everyday lives. They can be very complex or as simple as a grocery list used to remind us of items to be purchased at the supermarket. Regardless of what form a checklist takes, each of us needs reminders to assure that certain activities are accomplished as planned.

As pilots, our forgetfulness can have far more serious consequences than a second trip to the supermarket can correct. While the use of checklists is an integral part of every pilot's life, it is unfortunate that, in many cases, the extent of our instruction in its use is limited to, "this is a checklist, use it."

Over the years, improper checklist usage has been a contributing factor in both general aviation and airline accidents. In August of 1987 a McDonnell-Douglas MD–80, operated by Northwest Airlines, crashed on takeoff from the Detroit Metropolitan Airport. After an excessively long ground roll, the aircraft lifted off but was unable to achieve an adequate rate of climb and collided with obstacles beyond the departure end of the runway. The National Transportation Safety Board (NTSB) determined that the probable cause of the accident was "the flightcrew's failure to use the taxi checklist to ensure that the flaps and slats were extended for takeoff." Each year, NTSB files are filled with reports of general aviation accidents occurring because of "The failure of the pilot to follow the aircraft checklist and properly configure the aircraft."

Most pilots understand the importance of accomplishing some form of checklist during the various phases of flight. Because FAR § 91.3 holds the pilot in command directly responsible for, and the final authority as to, the operation of the aircraft, it is especially important for the pilot to operate the aircraft in accordance with the manufacturers' recommendations, including checklists, as published in the approved



Aircraft Flight Manual. In reviewing the Federal Aviation Administration Practical Test Standards, it is readily apparent how much emphasis is put on the use of checklists during the practical test for an airman certificate. The Objective for Tasks such as Visual Inspection, Pre-takeoff Check, and Emergency Operations clearly require the applicant to "follow a checklist." Although the importance of using the aircraft checklist is stressed throughout an applicants flight training, instructors occasionally fail to address using the checklist properly. Any use of a checklist is, of course, better than nothing. Problems begin to arise, however, when we allow improper usage to reduce the safety factor that checklists are designed to provide.

Very little information is currently available to the general aviation pilot concerning aircraft checklists and guidelines for using them properly. The majority of current training literature and aircraft flight manuals limit discussions to recommending a specific checklist with no emphasis on how to use it properly. Proper use is an important function of the overall checklist philosophy.

First, let us define exactly what we mean by the term *CHECKLIST*. A checklist is a systematic review of selected safety of flight items accomplished before a specific flight operation. Simply stated, it is a final check to assure that the aircraft is properly configured and functioning for the current phase of flight. Consider for a moment that the various checklists in use today have evolved as a result of past misfortunes which resulted in accidents.

BEFORE TAKEOFF CHECKLIST

FUEL TANK	☐ PROPER
ELECTRIC FUEL PUMP	☐ ON
ENGINE INSTRUMENTS	☐ CHECKED
FLAPS	☐ SET
CARBURETOR HEAT	☐ OFF
SEAT BACKS	☐ ERECT
SAFETY BELTS/ HARNESS	☐ FASTENED
TRIM TAB	☐ SET
CONTROLS	☐ FREE
DOOR	☐ LATCHED

Figure 1.

The use of checklists date back to the very earliest of man's attempts at powered flight. Development of checklists has been a trial and error process which has evolved through years of accident investigation and prevention efforts. The process is never ending. As aircraft and associated systems continue to evolve, so will checklist usage and theory.

Aircraft checklists generally fall into one of two basic categories: Normal or Abnormal/Emergency. Normal checklists include those pilot operations necessary to conduct a safe and efficient flight. These operations begin with the Preflight Inspection and conclude with Parking and Securing items. Abnormal/emergency checklists, on the other hand, include pilot operations designed to respond to the partial or complete failure of one or more components of the aircraft's systems. The primary differences between these two types of checklists are frequency of use and method of implementation.

As the name implies, the Normal checklist is used during routine phases of flight. At first glance, this type of checklist would appear very straightforward in both content and use. Upon closer examination, however, we discover an important concept of checklist design. The individual items to be reviewed are only a part of the overall checklist philosophy. It is important to note that aircraft checklists are not just randomly assembled collection of items to be tested. The order in which these items are tested is equally important. Aircraft manufacturers and the Federal Aviation Administration go to great lengths during aircraft certification to assure that checklist items are arranged in a sequence that precludes the possibility of causing an accident while trying to prevent one.

An example of this can be noted on the *Before Takeoff* Checklist in Figure 1. This checklist directs the pilot to place the fuel selector to the proper tank. Notice that this action is called for early in the checklist sequence. Of course, the purpose behind this arrangement is to allow sufficient time before takeoff to assure that fuel will indeed transfer from the selected tank. Imagine for a moment the consequences of delaying this action until the last moment before takeoff. The aircraft could very possibly become airborne with unsuitable landing terrain ahead before the pilot discovered a blocked fuel line.

A potential pitfall in checklist usage occurs when the pilot modifies the approved procedure to one of convenience. One of the most common examples concerns closing and latching the cockpit or cabin door before takeoff. Each of us can remember occasions when the door was left open until just before takeoff to help cool the cabin on a hot summer day. Although an open door may not constitute an in-flight emergency in most light training

aircraft, the problem is of much greater significance in many complex, high performance aircraft. Additionally, the potential distraction of an open door could prove to be overwhelming to an inexperienced or already over-burdened pilot.

The problem with deferring checklist items until the last minute is that it requires the pilot to depend on memory to return to and accomplish the item regardless of the circumstances taking place.

It must be emphasized that the reason we have checklists in the first place is to avoid having to continually depend on our memory.

So what is the proper way to conduct the checklist? Basically, there are two choices. The first of these, *verification*, confirms that specific safety-of-flight items have been accomplished at some point before entering a particular phase of flight. The pilot accomplishes a sequence of actions, such as configuring the aircraft for takeoff, and then uses the checklist to verify that the actions have indeed been accomplished. The disadvantage of using this method is that it again requires the use of memory to initially perform a specific action. Dependence on the follow-up checklist is then required to assure that all actions have been accomplished as planned. Unfortunately, distractions, such as a call from ATC or a question from a passenger, can cause a disruption of the checklist sequence and result in the pilot not verifying a critical safety-of-flight item that may or may not have been accomplished.

A more effective method of checklist usage is best described as the *READ & DO METHOD*. This means that as a checklist item is READ, the pilot should DO the appropriate action at that time. Should the pilot reach a point in the checklist sequence that requires additional attention or delay in accomplishing, simply stop the checklist at that point and proceed no further until the deferred item is completed. By using this method, there are no gaps in the checklist sequence that require filling before completion.

Another important aspect of checklist philosophy concerns the actual testing of each item. It is very important for the pilot to visualize how the checklist items should appear in the proper position or mode of operation. For example, it is not enough to simply "CHECK CONTROLS" for freedom of movement. The pilot should also look at the individual surfaces to assure movement in the proper direction. Visualization of how the actual control surfaces should appear in relation to the position of the control yoke of stick will provide a clear mental picture of whether the controls are indeed operating freely and correctly.

The use of the Auxiliary Fuel Pump provides us with another example. The Before Takeoff Checklist in Figure 1 directs the pilot to turn the pump on prior to takeoff. Placing the switch to "On" may be the proper response to the checklist, but this action alone does not meet the intent. In addition to turning the switch to the "On" position, the pilot should look for other clues that confirm that the pump is indeed on and working. Examples may include an increase in fuel pressure or an increased load on the aircraft electrical system.

As one would expect, use of abnormal/emergency checklists is somewhat different than that of normal checklists. The primary difference in using this checklist is that under certain emergency situations the pilot must rely on memory to immediately accomplish specific actions to alleviate or minimize the effects of system failure. The need to commit certain action items to memory is because of the possibility that timely action by the pilot could correct or lessen the extent of an emergency. In certain scenarios, taking the time to reference the emergency checklist could result in the situation deteriorating to an unacceptable point.

Another benefit of immediate recall actions in an emergency checklist is that they provide the pilot a starting point with which to begin formulating an emergency plan of action. In accomplishing these recall actions, the thought processes transfer from normal to emergency procedures. Logical actions then fall into place more easily as the situation warrants. Depending on the nature of the emergency (landing gear malfunctions, loss of electrical power, etc.) and the resources available (possibly an experienced passenger), the pilot may want to review or have the appropriate checklist read (Figure 2). This will assure that all actions in the emergency or abnormal procedure have been accomplished. It is vitally important, however, to remember that in any emergency, the pilot's primary responsibility is to FLY THE AIRCRAFT! It has been proven time and time again that becoming distracted from the task of flying the aircraft can be deadly.

ALTERNATOR FAILURE

ELECTRICAL LOAD	☐ REDUCE
ALTERNATOR CIRCUIT BREAKER	☐ CHECK
"ALT" SWITCH	☐ OFF (FOR ONE SECOND) THEN "ON"

LOSS OF FUEL PRESSURE

ELECTRIC BOOST PUMP	☐ ON
FUEL SELECTOR	☐ CHECK ON FULL TANK

Figure 2. Examples of abnormal/ emergency checklists.

One final point concerning checklist usage. Should the pilot become distracted in the course of completing the checklist, simply return to the beginning and start over. Pilot distraction is a significant contributing factor in aircraft accidents of all types. It is much more preferable, when distracted, to begin again and know that each checklist item has been completed than trying to remember where the sequence was interrupted and possibly miss an item that could cause an accident.

In conclusion, the safety value of the aircraft checklist is directly proportional to the effort the pilot puts forth in using it. Invest the time and effort to use it properly and it will protect you; using it improperly reduces your flying to a game of chance in which your luck will most assuredly run out. ■

PART FIVE

The Old Cap'n

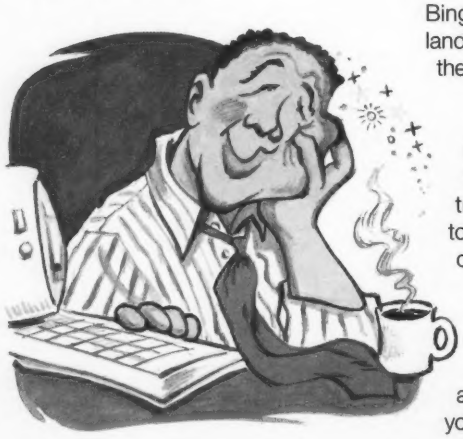
by Richard D. Hague

Seductively, Spring Fever tugged at my eyelids, murmuring, *"Just close 'em for a second. Give the old eyeballs a rest."*

"But what if I drop off? Fall out of my chair? I've got an image to maintain."

"Don't worry. Just a minute." Vaguely aware that my chin was in a graveyard spiral, a cat-nap was becoming more and more the sensible thing to do . . .

"Hop to it, Sonny! This is your office; not your bedroom," The stentorian bellow of the Old Cap'n snapped me, blinking, to attention.



"Captain," I protested, "I'm shocked and dismayed that you'd think for a moment that I was asleep. I was engrossed, in a contemplative mood when you, somewhat brusquely, I might add . . . "

"Yeah? Then swab the slobber off'n your chin before you redecorate your necktie, Bucko, and talk to me. What've your pilots been up to?"

Reluctantly, but eager to get this over with, I handed him a recent incident report.

Crosswinds 90 degrees across the runway at 10 gusting to 20 knots. Aircraft landed in a slip, bounced, weather-cocked, departed the runway, and rode up and over a 10-foot berm collapsing the nose wheel and stopping in a drainage ditch. The single occupant suffered a bump on her forehead when it contacted the glare shield.

"Well, tie me to a pole in my long johns and call me a wind sock! Where was this lassie . . . "

"Woman, Cap'n," I tried to correct, "woman."

". . . when her CFI was teaching crosswind landings? Why, this birdbrain ought to be *roosting* in a nest, not flying out of it."

At least, I thought, he's an equal opportunity disparager.

"And quitcher gigglin' out there unless you're ready for an afternoon with the Old Cap'n in his Steerman.

"Do you remember why, while training for your Private, you learned Slow Flight, crabbing down the railroad tracks, and then forward and side slips? Bingo! To prepare you for crosswind landings. My technique, which is also the best technique . . . "

Was there any doubt, I thought.

". . . involves three separate maneuvers: control your airspeed to 1.3 V_{S0}, hold a crab into the wind to track centerline until shortly before touchdown, and transition to a slip to control drift.

"Approach Speed: One point three times V_{S0}. One hundred thirty percent of your stall speed in the landing configuration. If your aircraft stalls at 38 knots, you'll fly your approach at about 50. If 1.3 V_{S0} equals 61, your approach speed would be about 80."

The Old Cap'n's hands were poised in the classic *Right Hand Making A Low Pass At The Wrist Watch* position. "The crab requires an outside straight line reference and a crosswind," he continued. "Track the road. Basic airmanship. You can do it in your sleep. In a crosswind landing, the extended center line of the runway becomes the railroad tracks and, if you're comfortable with 1.3 V_{S0}Approach Speed, the initial phase of your landing is a piece of cake. Your scan is runway-airspeed-runway-airspeed-runway . . . "

The Cap'n reached to my bookshelf and snatched the regulations. Quickly scanning Parts 23 and 25, he said, "Here's a *Gee Whiz* for you, Sonny: The design requirements consider that landings start at about 50 feet AGL and at 1.3 V_{S0}. Design requirements are such that there may be no uncontrollable ground looping tendencies in a 90 degree crosswind up to a velocity of 0.2 times V_{S0}, and that landing shall not require exceptional piloting skill. If your aircraft's V_{S0} equals 60 knots, it must be controllable at 60 knots times 0.2; a 12 knot crosswind. In other words, at 1.3 V_{S0}, you can be cross-controlled to the stops and not fall out of the sky."

Pleased with his scholarship, the Old Cap'n quickly turned serious. Drilling me with his sternest, no-nonsense glare, he rumbled, "Do not, under any circumstances, fly in a cross-controlled condition below 1.3 V_{S0}. Should the aircraft stall in a cross-controlled condition, the odds of affecting a successful recovery prior to an uncontrolled impact with terrain are slim to non-existent." Pausing for effect, he asked, "You got that, Sprout?"

I responded, "Yes Sir," as he continued. "Practice full cross-controlled flight slips with your CFI until you are comfortable with full aileron one way and full rudder the other. How does it feel? What do the pitot static instruments report when you slip to the right? The left? At different airspeeds? How does it sound? 'Course, it's easier in an open cockpit where you can hear the wind

singing through the wires, but you can still do it behind Plexiglas if you listen up real good.

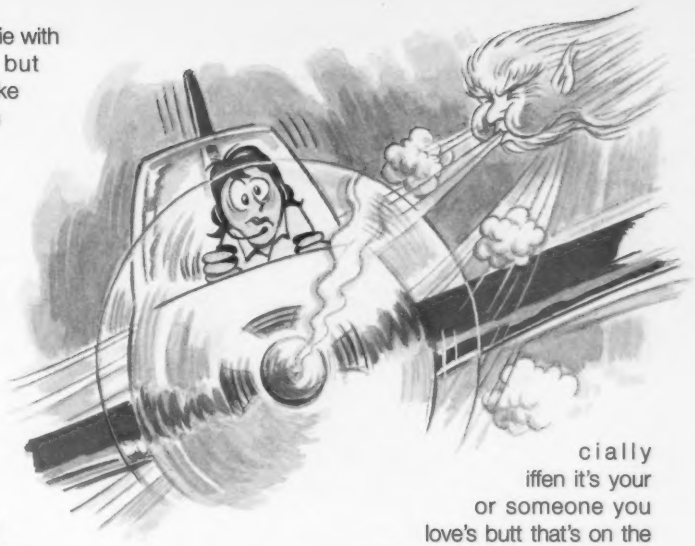
"Aircraft," he continued, "are meant to be flown in balanced flight. Trimmed for hands-off. Needle, ball, and control wheel centered. However, in a crosswind, a balanced flight landing is a gold-plated guarantee to rattle your nuts and bolts. Side loads on tires, airframe and landing gear are the least of your worries. Think about the downwind wing tip dinging the asphalt or a lateral bounce that can thump you off the runway like the gal whose lack of crosswind landing currency precipitated this crosswind refresher course.

"Precise adherence to V_{SO} is essential in performing a good crosswind landing. Some of you like to add a couple of knots for Grandma, the kids, the gusts, and still a couple more for the Old Cap'n because I'm so sweet, even-tempered, and lovable and you'd do about anything to stay on my good side, until you're almost back to cruise airspeed. If you're in a gusty crosswind where lots of additional airspeed is required to keep you in your Comfort Zone, your Comfort Zone may be at an airport where the wind tee is not pointing to the active runway."

"Thanks for the crosswind tune-up, Captain," I said, after I was sure he'd wound down on the subject. A glutton for punishment, I handed him the next incident report. "And while you're here, I'd like you to look at this."

Spring-time crosscountry flight over mountainous terrain. Engine failure precipitated a forced landing in the high country. No injuries, but the pilot, his wife and two small children suffered severe dehydration and exposure when rescued three days later. No flight plan had been filed.

"Well, toss me off the tower and call me, 'Sooperman.' How a skilled pilot capable of dead-sticking his airplane into a high altitude meadow could be such a turkey before he took off is beyond me. Where was your flight plan, Slick? Where was your Survival Kit, Bozo? It was 80 degrees at home and 72 at your destination, but the overnight lows along your route of flight were in the 30's. Just goes to show you can cover a mud pie with Cool Whip, but that don't make it a chocolate eclair.



"First of all, you can build yourself a seat pocket survival kit for a lot less than one of them fancy fur-collared leather flying jackets that you've been drooling over in the catalogues. And a well-thought out survival kit'll weigh less, too. If you don't know what to stick in it, ask your local Safety Program Manager. Depending upon the type of flying you do, he'll . . . "

"Or she," I murmured, even though it was probably hopeless.

". . . either have an answer for you, or he'll steer you to a military or Civil Air Patrol survival expert."

Uncrossing his legs, the Old Cap'n unconsciously pinched and stretched the crease in his jodhpurs. He leaned towards me and growled, "This is for those birdbrains out there that don't like to file Flight Plans. I don't care that you're not going any farther than from the tie-down to the fuel pits, *file*. I don't care that you're on a tower-to-tower clearance, *file*. I don't care that you've not filed a Flight Plan since World War Two, *file*. I don't care that you only do Day VFR around the bull pasture, *file*. And if you've forgotten how, read 5–4 through 5–7 in the *Pre-Flight* Section of the AIM (*Airman's Information Manual*). Then *file*."

The Old' Cap'n's hand descended towards his cavalry boot and rose gripping a wobble pump handle with which to punctuate his injunctions: "And I 'specially don't care that you don't file a Flight Plan 'cause you're afraid you'll forget to close it after you land. You're a pilot, dag-nabbit, so start acting like one! *File*. No if's, and's, or but's, 'specially iffen it's your or someone you love's butt that's on the line. *File*. 'Cause if you do, they'll most likely get to you before the engine cools down. *File*. 'Cause it don't cost a thing, and it buys you the most precious commodity in the world: sightseeing time in the back of a Search-and-Rescue helicopter after you've toasted your airplane."

Having served as the Old Cap'n's scribe for some months, I dared opine that a whit of whimsy might not be inappropriate. "Quit beating around the bush, Cap'n." I said, "Just say what you mean."

"Don't get cute with me, Bucko," he roared, "I'll handle the humor. You handle the keyboard. Got it?"

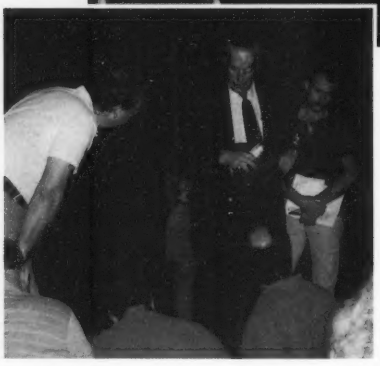
Chagrined, I muttered, "Yessir. Sorry, Sir."

"That's more like it. Nothin' overtorques my head bolts quicker than a young whippersnapper what's gettin' too fat for his froot-o'-the-looms." He rose from the chair adjacent to my desk, tugged at the fob hanging from his watch pocket, and regarded the hour. "I'm going to head over to the Flight Service 'fore I slip the surly bonds."

My chin jerked up from my chest, rousing me from my, uh, post prandial sleep interval (sounds better than "nap"). I had that detached feeling again, that feel of fantasy. Then, I saw a flight plan form on my desk, on it scrawled,

"Keep the blue side up, Squirt. See you around the patch." ■

Brigadier General William Spruance (retired)



Jim Cirrincione

Above: George Strickland, FAA Safety Program Manager, and General Spruance. Left: At the Farmingdale, NY, Safety Seminar.

by Jim Cirrincione

It was a warm, June night. The young man nestled into the back of the Lockheed T–33 parked on the ramp and made two small, but serious mistakes: He took off his jacket and failed to properly secure the nape strap a the back of his helmet.

The small, military jet had just flown into St. Louis from Colorado Springs for refueling. The two souls on board were heading home to the east coast. The pre-takeoff checklist was quickly completed, and the jet swung out onto the runway, its landing lights piercing the inky Missouri darkness. The Allison turbojet engine rose to a roar after the takeoff clearance, and the four tons of aluminum and steel hurtled down the runway.

The plane rotated normally and began its usual steep climb skyward. The gear and flaps came up. Suddenly, at 150 feet, the absolute minimum for ejection in that model, the engine quit cold. The pilot's panel lit up with warning lights, and both men could feel the sickening sensation of the sudden loss of thrust. Everything happened very fast after that. The pilot lowered the nose and attempted an air start. The jet settled in the darkness, heading for the woods at the end of the runway. The young man in the back seat glanced at the airspeed indicator: 125 knots.

He slammed his visor down and put his feet up on the bottom of the instrument panel for bracing. He immediately heard and felt the first impact, and his head snapped forward. The jet had hit a 110-foot tree at over 140 miles per hour, taking 35 feet off the top of the tree. As the plane fell heavily through the forest, now completely out of control, the canopy shattered. The initial impacts generated forces between 15 and 20 G's. The man's helmet rotated forward, because of the improperly adjusted strap, and flew off his head. The jet careened wildly, cutting an 800-foot long swath through the woods, and came to rest. The man's head, now unprotected, snapped backward and struck the metal plate under the headrest, knocking him unconscious.

When he came to, he felt fine, almost euphoric, which he realized was a danger sign. He was shocked to see flames surrounding him. The ruptured fuel tank was directly beneath him. Concerned about inadvertently setting off the ejection seat, he struggled to find the safety pins and holes to secure it, but couldn't. He loosened his seatbelt and got up as carefully as possible—*even though he was on fire*—to avoid snagging the ejection handles. He saw that half the aircraft had come to rest in a creek. He dived into the water to douse the flames and promptly slammed his head into a submerged log. He managed to resurface safely, but it took 17 minutes for rescuers to reach him through the thick cover around the crash site.

The man suffered serious burns to his face, arms, and legs. His nylon parachute harness straps were fused to his skin. The lack of a jacket deprived him of insulation that would have minimized his burns. His boots saved his legs. The pilot was killed.

Brigadier General William Spruance, now retired, is Chairman Emeritus of Embry-Riddle Aeronautical University. He was the man in the back seat of the T–33 that night in 1961. The accident was his baptism into his lifelong study of crash survival. He underwent 36 major operations over two years as a result of his crash. The engine failure which caused the crash was because of a fatigue break in the linkage to the fuel controller, and this temporarily grounded the T–33 fleet. Ironically, the plane he crashed in had already been scheduled for a modification that would have eliminated the problem, but the work had not been performed yet because of a lack of parts.

General Spruance's recent lecture series, sponsored by the FAA and the United States Aircraft Insurance Group and for which he received no fee, was a tremendous success. He played to packed houses of spellbound pilots around the northeast. He used a combination of ironic humor and actual experience to get across his serious message: It *can* happen to you, but there are several things you can do to prevent it and to protect yourself if it does.

I attended the General's lecture and spoke with him at the State University of New York at Farmingdale, Long Island. The event was co-sponsored by the Farmingdale Flight Standards District Office of the FAA and the Phi Chapter of Alpha Eta Rho, an aviation fraternity for aspiring commercial pilots. Over 300 people were in the audience.

The General made several main points which any pilot can benefit from while traveling in any kind of vehicle. I have attempted to summarize them below, with his pithy comments included were applicable.

Don't get complacent. Always use a checklist. Safety increases when you perform an operation the same way each time. "Once you break you standard procedure," he said, "you're spring-loaded in the accident position."

When you get into a plane or any other vehicle, use all the seatbelts available to you, but be able to open the door and unfasten the belts with your eyes closed. If you fly the same plane regularly, practice exiting it quickly. "That way, if you wind up upside down in [water], you'll be all right." If there's no seatbelt, the General says, "Sit directly behind the driver. Tell him you want him to go through the windshield first and make a nice, big hole for you."

Install a shoulder harness if your plane is not already equipped with one and, when using it, adjust it so that it's as snug as possible. You must avoid a secondary impact with the interior of the plane to survive.

Fly with clean clothes, and wear long sleeves, long pants, and avoid pure synthetic garments. Women should shun skirts and dresses because they can fly up over the head in a crash, exposing the torso and legs, often clan in flammable pantyhose, to injury and burns. Consider using nomex gloves (advertised in car racing and aviation magazines) and dual purpose garments, such as a "float coat", that are buoyant in water.

Wear a hat to protect your head and hair. If you use a helmet, remember to put the visor down before impact. Wear functional shoes. Never wear sandals or high heels when flying. Women's "spike" heels are notorious for causing problems with airline emergency exit chutes. They either snag and cause the wearer to tumble forward, or they rip the chute open, rendering it unusable by others. The General's wife always carries shoes with flat heels onto an airliner to change into before take off.

Keep a jacket near you. It can save you from burns in a fire and also prevent exposure if you are not rescued immediately.

Always carry a knife, a flashlight, and a sturdy metal whistle, preferably on a keychain or other object that is always with you. [If you're on an airliner, be mindful of security screening—security guards may not allow even a small pocketknife through the gate onto the airplane.—Editor]

If you smoke, quit or cut down. You need lung capacity for both flight at altitude and recovery from your injuries.

If you're the pilot, declare an emergency early. Crash trucks can get to you three to five minutes sooner if they're next to the runway rather than in the garage when you impact. The rule is "When in doubt, call 'em out." Says the General, "The crash crews are bored stiff anyway, so they'll welcome the diversion. Of course, if you declare an emergency, don't feel obligated to crash."

Practice bracing yourself for an impact. Make sure your seat is, or at least can be, adjusted so you can get your feet up on the bottom of the panel. Keep your torso back against the seat, but your chin tucked down against your chest. Even if you are flying the plane, tuck your head down, and fly the last few seconds peeking over the top of the panel.

In larger planes, know where all the emergency exits are and try to sit near one of them, against a bulkhead if possible. Be able to find the exits blindfolded, by counting rows of seats, if necessary.

Remember that propellers and helicopter rotors are "whirling meat cleavers," especially at night or in the confusion following an accident.

Don't put off maintenance, even if a problem doesn't seem directly related to safety.

If you're a homebuilder, think about safety while you're constructing your project aircraft. "Some designs have the latest technological breakthrough in the headrest, set up like a meat skewer you can hang your head on." In any plane, make sure the headrest is not too far down. Shoulder belts snap you back after restraining you. "If the headrest is not positioned properly, it will act like a chopping block, and you'll break your neck over it."

If you fly a pressurized aircraft, consider investing in a tool to break through Plexiglas, and keep it handy.

Go straight ahead if your engine fails at low altitude on takeoff, final, or on a go-around. After a crash, especially if inverted or in water, open the door first, then brace yourself and unfasten the seatbelt. Pilots have survived a crash landing only to break their necks when they unfastened the seatbelt.

If you see fire or smell fuel, use a handkerchief or other material as a filter to breathe through. On an airliner, always ask for a pillow and a blanket for that reason. In all cases of fire, ***MOVE FAST.*** "The difference between a minor flash burn and a third degree or even fatal burn is a matter of seconds."

If you're injured in a crash, think positively. Said the General, "When they kept pronouncing me dead, it was the only time I ever disagreed with a doctor."

Based on experience over the years, General Spruance estimated that five of the 300 people who heard him that night would need his advice in the near future.

After all that's happened to him, General Spruance only has two negative things to say about flying: 1) He feels sorry for the people who don't do it, and 2) he hates that dangerous drive to the airport. ■

General Spruance's lecture series last year was a big hit in FAA's Eastern Region. Contact FAA Eastern Region Safety Program Manager George Strickland at (718) 553–1132 for information on the General's schedule this year. Some of General Spruance's tips are elaborated on in the articles, "Fly Smart" on page 13, "The Use and Abuse of Checklists" on page 17, and "Passenger Checklist" on the inside back cover.

Reengineering the Airman Certification Rating Application (ACRA)

by Thomas M. Penland, *Manager, Program Management Branch*

The airman certification process has not changed significantly over the past half-century. Multiple forms were filled out, often containing duplicate information. Some documents were typed using a typewriter. Paper files were manually checked, transmitted, and stored. The process included steps that were inefficient and which added no value.

Redesigning the process would improve timeliness, eliminate errors, and reduce paperwork. Current information technology had the potential to facilitate administrative details, while also improving data quality and availability. The goal was to improve the process with management and inspector focus on substance rather than on administrative details. Improving the process would benefit the FAA and the public.

Select airmen at the 1994 Experimental Aircraft Association (EAA) Sun 'n Fun fly-in held in Florida during April and at EAA's Annual Convention and Fly-in at Oshkosh, WI, in July had an opportunity to participate in one of the FAA's Flight Standards Services latest ongoing developmental programs to help airmen around the world.

Airmen around the world require FAA certificates to perform a range of aviation-related activities. The new electronic Airman Certification and Rating Application (ACRA), provides on-the spot electronic transmission of certification data while ensuring that all certification requirements are met. ACRA will efficiently process over 250,000 airman certificates Flight Standards issues each year. Several organizations, including IASCO, American Airlines, Purdue University, Simuflite, HAI, Jeppesen-Sanderson, and Parks College, participated in prototyping ACRA. In 1994, certified users of this system will be able to produce the following:

Temporary Certificate
(including appropriate limitations)

Student Pilot Certificate

Written Test Authorization

Oral and Practical Test Authorizations

Certificate-Specific Airman Application

Letters of Competency

Letters of Authorization
(airworthiness)

Foreign Pilot Certificates

Military Competency Certification

Why Reengineer the Certification Process?

a. Improve the effectiveness of the certification process.
b. Ensure regulatory requirements are met before any certificate is issued.
c. Streamline the flow of data between the key components of the system, i.e., examiners/aircrew program designees (ADP), the Flight Standards Field Offices, both the Flight Standards District Offices (FSDO's) and the Flight Standards Certificate Management Offices (CMO's), and the Registry.
d. Automate manual processes, providing new functionality, improving the current operation, and providing greater access to more accurate and timely data.
e. Provide a simple, user-friendly software module that will support the improved process.
f. Reduce inspector and clerical workload at the FSDO and assist certification officers in the field.

ACRA eliminated a substantial number of steps in the certification process. For example, 62% of the manual steps at the field level in a typical FAR Part 121 airline transport pilot (ATP) certification by an inspector were eliminated. ACRA uses personal computers (microcomputers) at the point in the certification process where an application is accepted by the Administrator. The microcomputers provide error-checking, data validation, data transfer, and reporting capabilities. Data are entered once and only once. ACRA integrates vertical Flight Standards data base system, linking them into a global corporate data. ACRA makes certification data more reliable and accessibile.

The FAA and the United States Postal Service are currently working to establish the electronic signature. To do business electronically, electronic documents must be as commercially acceptable and legally admissible as their paper-based counterparts. The ability to produce electronic documents that are legally binding within the court system will be a major step forward in the way the Government does business in the future. It will allow for the true paperless office of the future. ■

Shared Responsibility

Part II
A DOT/FAA Aviation Safety Action Plan for Zero Accidents

by Phyllis Anne Duncan

In early January this year, Secretary of Transportation Federico Peña convened a massive aviation safety conference in response to an unexpected spate of commercial airline accidents in the latter half of 1994. Attended by nearly 1,100 industry, labor, and government aviation safety experts, the conference concluded with hundreds of recommendations and a promise from Peña to provide an action plan within 30 days of the conference. (For details on the content and scope of the January conference, see the March 1995 issue of *FAA Aviation News.* If you are a new subscriber or otherwise did not see that issue, contact the Editor at 202–267–8017 for a copy.)

Unlike some who feel that government can't fulfill its promises to the American public, the promised action plan was published on February 9, 1995, precisely on time. The 63-page document, *Zero Accidents . . . A Shared Responsibility*, summarizes the conference and provides a detailed matrix of 173 initiatives which were responsive to the issues and approaches generated at the workshops. The Action Plan also includes milestones for accomplishment of the initiatives; nearly 100 are to be accomplished quickly—by the end of fiscal year 1995 (September 30).

At the conference workshops had been held covering the areas of Crew Training, ATC and Weather Issues, Safety Data Collection and Use, Applications of Emerging Technologies, Aircraft Maintenance Procedures and Inspections, and Development of Flight Operating Procedures.

Aviation Safety Action Plan

The Aviation Safety Action Plan reflects the theme that most conference speakers drove home: Aviation safety is a shared responsibility. In the 30 days between the conference and the publication of the plan, airlines began voluntary actions to establish a safety office reporting to the airline's CEO. The plan also includes an FAA commitment to publish in 1996 a new regulation that will require an independent flight safety department at every airline operating with more than nine passenger seats. This is a follow-on to the Notice of Proposed Rulemaking, published in March, requiring one level of safety for all air carriers operating aircraft with more than nine passenger seats.

Other new initiatives include:

(These are only a handful of the key initiatives and milestones outlined in the Action Plan.)

Sharing Safety Data

- A DOT policy protecting data collected by airlines as part of their Flight Operations Quality Assurance (FOQA) programs from use in FAA enforcement action
- A demonstration project, beginning this month, to start FOQA programs at several airlines
- The FAA's making its National Aviation Safety Data Analysis Center (NASDAC) available to all users

Crew Training

- Broadening of the understanding of the Advanced Qualification Program (AQP) through industry seminars beginning in May
- Streamlining of the administrative aspects of AQP by October 1995
- Immediately adding additional FAA staff to facilitate processing of AQP applications

Maintenance Factors

- Expanding the FAA 1995 Strategic Plan to provide for development of Maintenance Resource Management (MRM) programs based on successful Crew Resource Management (CRM)
- Developing new, regulatory qualification standards for airline maintenance technicians during fiscal year 1995

Emerging Technology

- Improving approach and navigation capabilities through the expanded use and rapid implementation of satellite navigation systems
- Achieving an agreement with the user community on implementation of two-way datalink to reduce communication errors and improve distribution of weather information

Other Initiatives to be Completed by September 1995

- A definition of human factors requirements in advanced maintenance concepts
- A national database for aviation human factors research
- A human factors design standard
- An updated human factors guide for industry and government that includes information on human factors environmental aspects related to maintenance.

Zero Accidents

When brought up by FAA Administrator David Hinson in his opening remarks at the conference, the concept of "zero accidents" caused a discernible jolt of surprise among the conference's attendees. Most "aviation safety experts" had always considered this concept of being accident-free as an unattainable pipe dream. Where you have flawed humans flying airplanes built and maintained by other flawed humans, the reasoning went, you're going to have accidents. Yet we went 831 days—more than two and a quarter years—without a single fatality in a commercial airliner crash. (During that time there were several incidents involving such aircraft which, because of damage to the aircraft or extent of injuries to persons—encountering in-flight turbulence being the best example—had to be classified as "accidents" because of National Transportation Safety Board definitions of "accident" and "incident.")

Given that remarkable achievement, is it really a fantasy to think of attaining zero accidents?

To Hinson, it is not a matter of thinking about attaining zero accidents; it is a policy that aviation interests in government, industry, and labor must adopt, embrace, and live by. Emerging technology, an intellectual approach, and "training, training, training" Hinson believes will make zero accidents a reality, a way of life, and not a dream.

It's a pretty good mantra to repeat to ourselves on every flight, before every decision, on every approach—*ZERO ACCIDENTS*. ■

FlightFORUM

• Ultralight Vehicle Defined

I enjoyed reading the article "Ultralight or Aircraft," written by H. Dean Chamberlain in the April 1994 edition of FAA Aviation News. *However, I found amusing the logic and example of saying "No matter what its color, a duck is a duck" to argue that if it doesn't meet the definition of an "ultralight vehicle" found in FAR Part 103, then it is an "aircraft."*

The very creation of the "ultralight vehicle" definition found in FAR Part 103 ignores the "duck is a duck" theory and in fact runs counter to the definition of "aircraft" found in Section 101 of the Federal Aviation Act of 1958, as amended. In the definition found in Section 101(5), "aircraft" is stated as meaning any contrivance now known or hereafter invented, used, or designed for navigation of or flight in the air.

In light of that definition how can Mr. Chamberlain, or the FAA, say with a straight face that an ultralight is not an aircraft? Where is the magical formula that allows a regulation to be counter to the very precise definition of an "aircraft" found in a statute enacted by Congress, and which also created the FAA? I hope Mr. Chamberlain had his tongue planted firmly in his cheek when he wrote that part of an otherwise excellent article.

L.S. Edwards
Federal Way, WA

Any aircraft that meets the definition of an ultralight vehicle as defined in FAR Part 103 can be operated as an ultralight vehicle subject to the regulations listed in FAR Part 103. FAR Part 103 lists the requirements for operating such a vehicle. One of our points in writing the article was to remind everyone that there are Federal Aviation Regulations that apply to everyone who flies, including those who fly ultralight vehicles.

• Invulnerable Attitude

Regarding accidents because of continued VFR into IMC, as a CFI and designated examiner, I have mixed feelings about the Private Pilot Practical Test Standards (PTS) and requirements for Flight by Reference to Instruments (Area of Operation VI). We train students to fly by reference to instruments, we require a standard of completion so they can demonstrate their ability to fly by instrument; then we tell they can't do it.

I think too much emphasis is placed on instrument flying in the first place (integrated flying), rather than requiring outside attitude references. I know a student should have some instrument training because inadvertent entry into fog or clouds can happen, but I think we encourage IMC flight by the level of training given and required by the PTS.

I don't know what the "answer" is for sure. We can regulate forever and it won't help an "invulnerable attitude." I do know I feel better about a student flight or BFR when the pilot reviews instrument flight and becomes very aware that he/she cannot handle that type situation for more than a few minutes. Hopefully, this will cause them to refrain from getting into a situation they know is uncomfortable and/or dangerous.

Bev Cameron
Erie, CO

FAR § 61.107(a)(6) states in part, that an applicant for a private pilot certificate with an airplane rating must show competency in controlling and maneuvering an airplane solely by reference to instruments, including descents and climbs using radio aids or radar directives. The purpose of this training is precisely as noted in your letter. Hopefully, it will cause non-instrument rated pilots to refrain from getting into a situation they know is uncomfortable and/or dangerous by recognizing their inability to fly solely by reference to instruments in other than an emergency situation and for a limited period of time.

Finally, flight instructors should strongly emphasize to their students that the above training is not instrument training toward an instrument rating, but is designed to provide an escape method in the event of an emergency requiring the pilot to descend below or climb above a thin layer of clouds while using VOR, ADF, etc., and communicating with ATC.

FAA AVIATION NEWS welcomes comments. We may edit letters for style and/or length. If we have more than one letter on the same topic, we will select one representative letter to publish. Because of our publishing schedules, responses may no appear for several issues. We do not print anonymous letters, but we do withhold names or send personal replies upon request. Send letters to Editor, FAA Aviation News, AFS–810, 800 Independence Ave., SW, Washington, DC 20591, or FAX them to (202) 267–9463. INTERNET address: Phyllis-Duncan@mail.hq.faa.gov

• Medical Questions

Because of the number of questions asked in this letter, we are answering the questions in the order asked. The answers are in ***bold*** *type.*

I have the understanding that a second class medical is required in order to exercise instructor privileges for compensation due to the commercial license requirement. With the requirement of a commercial to get an instructors license, do you need a second *class medical to go for the instructor check ride?* ***YES***

Can an instructor exercise his/her instructor privileges with a third class medical? ***YES***

If an instrument instructor has lost his/her medical, can he/she continue to instruct and with what limitations? ***YES—Cannot be PIC or a required crewmember***

Can an instrument instructor without a current medical provide instrument instruction and log it as second in command [safety pilot?] ***NO***

Second in command requirements [FAR § 61.55] state that only a pilot with a certificate with appropriate category and class ratings is needed, no mention of current medical or currency is stated. Yet to be a pilot does require a current medical. So, I would believe that the regulation means a current pilot. But it

InstrumentCORNER

• When is an Approach not an Approach?

I am totally confused and need your help. For the sake of legalities in IFR currency—

a) What constitutes an "approach?" Does the descent have to be made from full-time in the soup down to minimums? If minimums are not available, is breaking out at 1,200 ft for a 290-ft DH (crude numbers, only to make the point) count as an approach? Does 1,500 ft still count? How high do the tops have to be? Do they have to be above the FAF? Does shooting through a 1,000 ft layer of coastal fog make half an approach, of which one has to make 12 to count for the six required approaches?

b) What constitutes flying in IMC? Is flying between solid layers from cloud bank to cloud bank legally IMC? Is flying in a layer of broken ceiling IMC? Do people fly with the stopwatch in their hand (a third hand, perhaps) to time and subtract every 30 seconds of time when they can see past the cowling from their legal IMC time—as one of my instructors books time? Trouble is, he looks out to the right side where he sees ground sometime, and I look out to the left side where I don't see ground, so our time keeping disagrees quite a bit.

Please help!

Louis Temesvary
Palo Alto, CA

If your instrument instructor doesn't know or won't pass along the answers to these questions to you, fire him and hire someone who will.

FAR § 61.57 states that no pilot can act as PIC under instrument flight rules (IFR) or in less than VFR minimums unless within the preceding six months, the pilot has logged six hours of instrument time (three hours in flight and in the category of aircraft involved) and accomplished six instrument approaches, or unless the pilot has accomplished an instrument proficiency check in the category of aircraft involved.

FAR Part 1 doesn't define "approach," but the *Airman's Information Manual* (Glossary I–2) does:

"A series of predetermined maneuvers for the orderly transfer of an aircraft under instrument flight conditions from the beginning of the initial approach to a landing or to a point from which a landing may be made visually."

FAA believes it is reasonable to expect that, for currency purposes, a pilot fly a significant portion of the elements which constitute an approach. This is to assure that the pilot gains the benefit of configuring the airplane to comply with the published parameters for heading, altitude, speed, timing, and descent rate required for the approach.

The AIM defines IMC as "meteorological conditions . . . less than the minima specified for visual meteorological conditions." VFR minimums are found in FAR § 91.155.

FAR § 61.51(c)(4) states that "A pilot may log as instrument flight time only that time during which he operates the aircraft solely by reference to instruments, *under actual or simulated instrument flight conditions*." [Emphasis added.]

could be interpreted that just a pilot certificate is required and no current medical. ***In an aircraft a pilot must have a current and appropriate medical to be either PIC or a required crew-member [FAR § 61.3(c)]. Pilots flying gliders or balloons are excepted. glider and balloon pilots certify to their own health.***

If an instructor loses his/her medical, can he/she fly in the left seat of an aircraft for training someone else other than a primary student? ***YES, as long as the other pilot is PIC and the instructor is not a required crewmember.***

With reference to the last question, if the aircraft does not have similar controls on both sides such as brakes, could an instructor without a medical, fly at the controls where the instructor has the only full set of controls? That last question illustrates the possibility that at some point the instructor has to be the only person in sole control of the aircraft (such as taxiing, takeoff and landing). ***NO, the instructor cannot be PIC or a required crewmember.***

David Schrader
Livonia, MI

• Mystery Artist

I enjoy the "Old Cap'n" series. However, I noticed that the magazine lists the author," but not the name of the talented artist who draws the cartoons. Why don't you list the name of the artist?

Name withheld by request

We don't list the name of the artist or of the magazine's typographer and design specialist because they are employed by the U.S. Government Printing Office (GPO). GPO's policy is not to list the names of its employees in the publications they work on so we comply with the GPO policy and do not list the names of any GPO employee in our mast head. But since you asked, the artist's name is Bill Ballou and our designer and typographer's name is DiAnn G. Baum. Both work in Washington, DC.

Notes from Tornado Alley

In the Midwest, the wild and wicked storms of spring may climax in tornadoes and thunderstorms that challenge the avoidance strategies of pilots and controllers alike. Several NASA Aviation Safety Reporting System *(ASRS) reporters describe the hazards—both expected and unexpected—of aircraft operations in "tornado alley."*—Callback Editor

Thunderstorms and their associated weather conditions wreaked havoc on the [Midwest city] area over the weekend. It was my unfortunate "luck" to have been flying frequent trips in that area that weekend. City received 7.06 inches of rain . . . mainly the result of one weather system containing thunderstorms and tornadoes . . .

As we approached the airport from the east, the weather system was approaching from the west. It appeared as through the airplane would win the race as we received two special ATIS reports . . . . Both airborne radar and ATC showed the storm west of the airport. ATC continuously advised us as to the movement of the storm and we discussed possible wind shear amongst the pilots. All conditions for a safe approach, however, appeared to exist. We missed the first approach due to a very tight turn onto the ILS exaggerated by variable winds at 1,500 feet AGL. On the second attempt, the weather was close to the airport and, as we intercepted the glideslope at 160 knots, 2,700 feet MSL, our airspeed increased to 230 knots. We immediately executed a missed approach, Approach Control provided us vectors clear of weather, and Center provided holding instructions for us that kept us VMC. Everyone did their jobs well and provided a very good safety margin. We eventually diverted to another airport and returned to original destination some four hours later when the storm finally moved on.

The FAA's emphasis on wind shear detection, avoidance and inadvertent penetration maneuvers served us well in this instance. It's nice to know that the training does pay its dividend in life and equipment savings.

A general aviation pilot failed to reckon with several other hazards associated with the aftermath of a tornado-saturated airspace around a disaster site, and possible temporary Restricted Areas:

In the midafternoon, tornadoes ravaged the nearby town. That evening, friends who were still unable to reach their family members in town asked if I would fly over in an effort to determine the extent of damage near the family [home], and whether it was accessible by road. I said I would try and together with another pilot who volunteered to help fly while I searched, we set out for the neighboring town in a borrowed aircraft.

Initially we planned to remain at least 2,000 feet above any obstacles in the area. However, in the poor light of dusk with both of us looking for landmarks that had been made almost unrecognizable by the storm, we inadvertently went below the appropriate minimum altitude. Just as we noticed our deviation, a traffic conflict with one of the many other aircraft circling the disaster area forced us still lower. When we were sure the other aircraft was clear we climbed back to an appropriate altitude [1,000 feet AGL] and remained at or above it as we exited the area to the southeast.

Although our effort was made with the best of intentions, it is apparent now that we should have considered staying away from the area at least until morning. If an aerial survey was still necessary, then at least there would have been more light and less air traffic. With few distractions, it is likely we would not have been drawn away from our 1,000 foot minimum altitude.

Editor's Note: This appeared in the April 1994 issue of *Callback*. Anyone interested in receiving a copy of NASA's monthly safety bulletin on the ASRS should contact them at: The Office of the NASA Aviation Safety Reporting System, P.O. Box 189, Moffett Field, CA 94035–0189.

Recent Accident Trends

Accidents appear to occur in bunches and the causes are often similar. The newest accident trend for pilots is to make emergency landings and botch their attempt to land without damage to the aircraft or occupants. The usual cause, of course, is running out of gasoline (or kerosene) for one reason or another. Many pilots experience an engine stoppage and proceed to crash when a simple procedure called "switching tanks" could have averted an accident.

Pilots are encouraged to brush up on their emergency landing techniques. Consult your flight instructor or come to a "WINGS" program and meet someone who can help prepare you for an emergency. Look for emergency fields while flying around. Appraise the runway environment for possible escape routes in the event a power loss occurs right after takeoff. Believe that—yes, it can happen to me and often does! Prepare for the worst.

Another way to prevent engine failure due to fuel starvation is to consult your aircraft performance charts. Learn about the fuel system, how it works and how to switch tanks. On short flights start with full tanks and measure how much fuel the aircraft actually burns. It might burn more per hour than the charts suggest. It probably will not burn less, however! Be conservative. A precautionary landing is ALWAYS cheaper and less humiliating than an accident!

Passenger Checklist

Suggestions to Help Make Your Safe Trip Even Safer

Note to general aviation pilots: Adapt this for your passengers' use. It gives a favorable impression of general aviation and let's people know we're just as safety-minded as the airlines. And it may save a passenger's life.—Editor.

Sensible Clothing

- ✔ Shirt—long sleeved, natural fabrics
- ✔ Slacks/Pants—Long, natural fabrics
- ✔ Shoes—Leather or canvas and low-heeled.

Child Safety Seat

- ✔ Check with airline for policy on use before arrival at airport.

On Board the Aircraft

- ✔ Safely stow carry-on baggage.
- ✔ Wear seatbelt snug and low across the hips.
- ✔ Keep your seatbelt fastened at all times.
- ✔ If you take your shoes off, put them on before landing.
- ✔ Review the passenger safety card before each takeoff and each landing.
- ✔ Listen carefully to the safety briefing.
- ✔ Ask questions if safety information is not clear.
- ✔ Make a mental plan of the actions you would take in an emergency.
- ✔ Be familiar with all exits.
- ✔ Count seat rows between you and at least two exits.

Exit Row Seating

- ✔ Listen to the safety briefing and/or read the written instructions for aircraft specifics.
- ✔ You must be physically capable and willing to perform emergency actions. If not, request another seat.
- ✔ You must know your responsibilities in the unlikely event of an emergency.
- ✔ Asks questions if instructions are not clear.
- ✔ Consider the effects of alcoholic beverages.

In the unlikely event of an emergency, you should be aware of the following:

Evacuation Slides

- ✔ Jump feet first into the center of slide.
- ✔ Do not sit down to slide.
- ✔ Place arms across chest, elbows in, and legs and feet together.
- ✔ High-heeled shoes can damage slides.

Rapid Decompression

- ✔ Pull oxygen mask toward you to start oxygen flow.
- ✔ Put your oxygen mask on as quickly as possible.
- ✔ Help children and others with their masks.

Flotation Devices

- ✔ Know where they are and how to use them.
- ✔ Life vests (under seat, if available), life rafts, and some seat cushions and evacuation slides can be used as flotation devices.

Evacuating the Aircraft

- ✔ Follow instructions of crew member, if possible.
- ✔ Stay calm and proceed quickly to exit.
- ✔ Leave all your possessions behind.

Fire or Smoke

Inflight—

- ✔ Use wet paper towel or handkerchief over nose and mouth.
- ✔ Move away from the source of fire and smoke.

On Ground—

- ✔ Stay low.
- ✔ Proceed by your predetermined count of seat rows to exits and/or follow floor proximity lighting to an exit.
- ✔ Exit the aircraft.
- ✔ Leave all your possessions behind.

Outside the Aircraft

- ✔ Move away from aircraft, fire, and smoke.
- ✔ If possible, help those requiring assistance.
- ✔ Remain alert for emergency vehicles.
- ✔ Never go back into a burning aircraft.

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